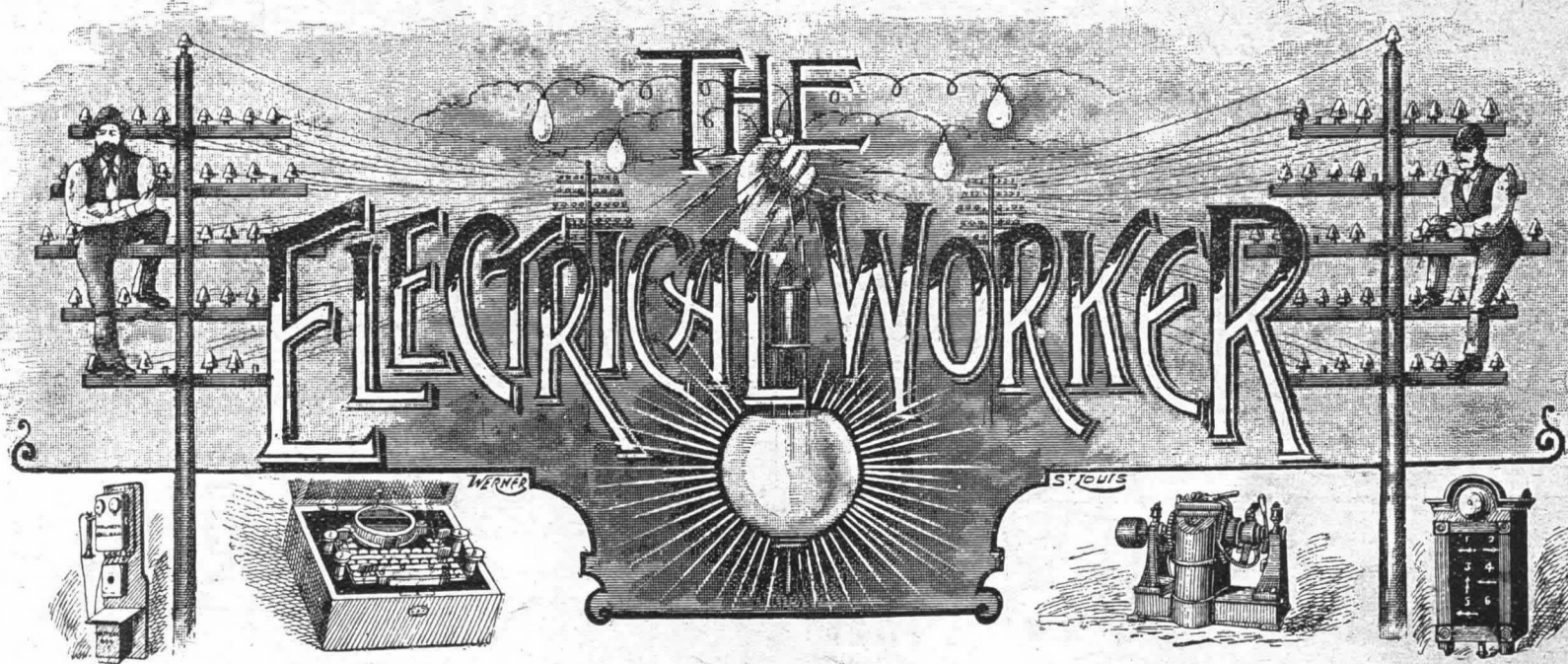


MAR 1893 P. A1



Official Journal of the National Brotherhood Electrical Workers of America.

VOL. 1.

ST. LOUIS, MARCH, 1893.

No. 3.

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WORLD'S CHOICE.



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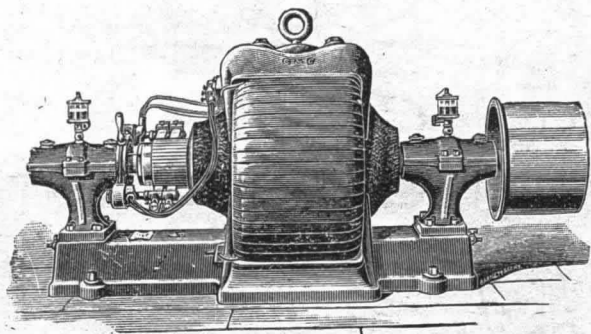
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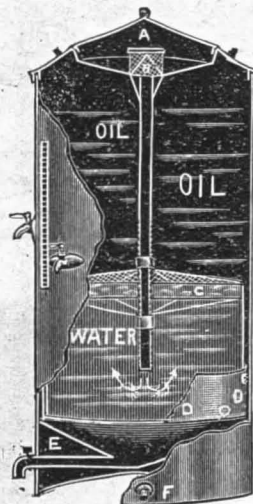
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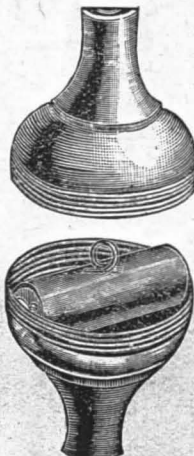
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JAMES I. AYER.

**James I. Ayer.**

James I. Ayer, late President of the National Electric Light Association, and general manager of the Municipal Electric Lighting Company of St. Louis, is a typical electrical engineer of to-day. Born in Medford, Mass., in 1854, he early followed Horace Greely's advice and went West to grow up with the country. Mr. Ayer is a favorite with the electrical workers in St. Louis, and we hope that the friendly feeling that exists between his company and the electrical workers will continue for many a year.

**Judge E. A. Armstrong.**

Edward A. Armstrong, the new President of the National Electric Light Association, has been



JUDGE E. A. ARMSTRONG.

prominently connected with the central station interests of Camden, N. J., for several years. Judge Armstrong is a fluent speaker, an agreeable gentleman, and an enthusiastic and energetic promoter of any scheme that will advance the interests of Central Station men.

**Nikola Tesla.**

Nikola Tesla was born in Montenegro, a small independent principality in Southern Europe, on the eastern coast of the Adriatic Sea, but has been in the United States many years. For the greater part of the time he has been connected with the Westinghouse Electric and Manufacturing Company, making extensive research in connection

with the alternating current. Mr. Tesla has demonstrated a number of facts of much importance as to the nature of electricity. Much interest has been attached by his operation of a motor on one wire and even without connecting it with a generator, and in the matter of electric-lighting he has produced some startling results which open a field for wide research and give promise of remarkable developments in the near future. Last year Mr. Tesla sailed for Europe with invitations to lecture before the leading scientific organizations of the continent. Probably no American electrician or scientific man was ever received by the scientific men of Europe with such honors as were conferred upon Mr. Tesla.



## The Tesla Lecture In St. Louis.



Nikola Tesla.

The Tesla lecture was a notable feature of the convention. At first it had been proposed to deliver the lecture in a small hall, but the demand for tickets was so enormous that it was decided, as a matter of sheer necessity, to secure a larger auditorium, and this was found in the Exhibition Theatre, which seats about 4,000 people. It was, of course, practically impossible that all could hear and see, but those who were there could at least say they had seen Mr. Tesla afar off and witnessed some of his most striking experiments. The hall was crowded to suffocation, and the demand for tickets was so great that they were selling briskly for three and five dollars on the steps of the hall. Under such circumstances Mr. Tesla contented himself wisely with showing some of the more "spectacular" of his experiments, and even these were followed at a disadvantage in view of the immense distance from which most of the spectators studied them. After his introduction by Mr. Ayer, the lecturer gave a few minutes to a statement of the conditions involved in his work, and then by means of his high frequency and high voltage currents, aided by disruptive discharge from a condenser through an induction coil—as well as by direct dynamic phenomena, he produced a number of the interesting results that have already made his name famous and have charmed two worlds. He received, unhurt, currents of hundreds of thousands of volts, lit-up tubes and lamps through his body, rendered insulated wires several feet long entirely luminous, showed a motor running under the influence of these million-frequency currents, obtained a number of effects with phosphorescent lamps; and also showed how little in such work the high resistance of the filament had to do with the lighting up of ordinary 50 or 110 volt lamps. His ability to produce such effects, either with a single wire and no return or without any wires at all, aroused the utmost interest and enthusiasm and the concluding demonstration literally brought down the house, when he showed how by simply carrying lamps or tubes into a room or hall where those currents were being developed, illumination was the immediate result.

In his opening remarks Mr. Tesla enlarged upon the grandeur of Nature, and expressed his opinion that the most wonderful of the external influences that affect us is light. Hence it followed that the most wonderful and important of the organs by which these external influences beat in upon us is the eye. Two facts were especially referred to, one of them being that the eye is the only organ capable of being affected directly by the vibrations of the ether. Another fact was that the eye would be able to distinguish objects at almost any distance, were it not for the minute particles and stray gases filling the intervening space. These absorb the energies of the ether vibrations, but in a pure medium they would travel unchecked, and the range of vision would be infinitely greater. Mr. Tesla then alluded to the importance of the part played by the eye in furnishing the race with its ideas and knowledge, and to its vital function in controlling all our motions and actions. From its teaching were derived consciousness, ideas, conceptions that were impossible without images—and images involved sight.

By these interesting stages, Mr. Tesla led up to the subject of light and thence to the part of electricity in giving us light. The general aim of the discourse was to show and explain the phenomena due to electrostatic forces, followed by phenomena produced by electro-dynamic agencies; and then, as a third class, the light effects, Mr. Tesla's idea evidently being to give a generalization of these phenomena, and of their relations. It was stated, parenthetically, with regard to the physiological effects produced with the high tension, high frequency currents employed, that a great amount of

energy may be sent into the body of a person by their means, merely because the energy was dissipated laterally from the body and was not passed through the body in the direct manner involved in the use of a low frequency current. It was due to this intense rapidity of vibration that the lecturer was able to receive with impunity currents of as high as 250,000 and 300,000 volts, and of an amount which otherwise administered would kill. The lecturer explained that he had so arranged his apparatus that in case of any failure of any part of it, the current would kindly abstain from killing him, and would only knock him down.

Many of the experiments shown have already been seen either in this country or in Europe, yet there were several novel effects introduced, and even the familiar experiments were performed with apparatus different from that used before. In most of the experiments the ordinary alternating and continuous currents from the central station were used, although Mr. Tesla also had his own special generator running in the basement.

A striking new experiment was to show at the beginning of the lecture, the effect of a varying electrostatic stress through the dielectric. The experiment was performed by grasping one terminal of the high tension transformer giving about 200,000 volts pressure, and approaching the other hand, to the opposite terminal. Streams of violet light then issued from the fingers and the whole hand. (At the lecture on the preceding Friday at the Franklin Institute in Philadelphia, Prof. Houston noticed these streams of light coming also from the lecturer's back, following roughly the line of the vertebral column).

Another experiment was performed showing the action of the air between two condenser plates. By attaching these plates to the high-tension transformer, the whole space between these plates was filled with light, the distance apart being about ten inches. It was pointed out that these streamers consumed considerable energy and developed abundantly ozone and nitrous acid, and it followed that it was necessary to exclude air from high-tension apparatus.

The action of the air was shown in another very striking experiment. Two incandescent lamps exactly alike, one exhausted, the other not, both of the ordinary 50-volt type, were attached in multiple arc, and a current vibrating about one million times a second or thereabouts was passed through the filament. It was demonstrated that the lamp which was exhausted glowed brightly, whereas the other one in which the filament was surrounded by air, at ordinary pressure, did not glow. Yet the latter lamp got hotter than the other. This showed the great importance of the rarefied gas in the heating of a conductor, and it was pointed out that in incandescent lighting a high resistance filament does not at all constitute the really essential element of illumination, along these lines. Also that heavy blocks of metal may be brought to incandescence by minute currents provided they are surrounded by rarefied gas, and provided the potential and frequency of the currents is sufficiently high.

One of the most interesting experiments was the conversion on open circuit. A transformer was taken and the current passed through the high tension winding in such a way that only one terminal was attached to the source of the rapidly alternating current. In spite of this there was a current passing through the primary as though the other terminal was actually attached to the source like an ordinary return circuit. This open circuit transformer contained a secondary low tension winding, and the minute currents passing through the primary were transformed into currents capable of following the ordinary electric wire and lighting up brilliantly an ordinary lamp. It was pointed out that under certain conditions, indeed, such a conversion was quite practicable and that it can be practised with high economy. It was further pointed out that any kind of device such as motors, etc., may be operated in this manner, with one wire or circuit only.

Mr. Tesla in the course of his lecture dwelt upon his method of conversion by means of disruptive discharges from continuous or alternating station supply. There were two kinds of apparatus on the stage, one operated from the alternating circuit and the other from the regular direct current system. A peculiar form of discharger was used contained in a mica-lined wooden box. The spark-gap was warmed by a small lamp underneath, for the purpose of making the air dielectrically weak. This enabled Mr. Tesla to work with a very long gap, a very sensitive arc, and a comparatively small electromotive force in the gap. The effects obtained were thus augmented very materially. It was pointed out that with this method of conversion, there is no difficulty whatever in obtaining sparks of any length. It becomes simply a question of the energy supplied, through what distance the spark will be visible. During the lecture, lamps were operated by this method of conversion. An ordi-

nary 100-volt, a 50-volt and a two-volt lamp were brought up to full candle-power with equal facility. Then a little motor was run by means of these disruptive discharges, it being a phase-motor comprising simply an iron core with a closed secondary coil in it, and a disc armature arranged to rotate above the core. Mr. Tesla remarked rather naively that if the demonstration were not quite equal to the expectation, the long continued and weary work on the development of the invention, besides the inability of the experimenter, might be the cause. He went on, in connection with this, to refer to the transmission of power from Niagara and gracefully recognized the presence on the platform of Prof. George Forbes, who is so prominently identified with this great work. Mr. Tesla believed that we were about to see such great powers transmitted long distances, and over one wire.

Continuing, Mr. Tesla remarked that he had shown things of a more spectacular nature with reluctance, yet forced thereto by the desire to gratify those who had shown their interest and formed so large an audience. A number of experiments were performed not seen in this country before, though some had been shown in England. For instance, a phosphorescent bulb was lighted up by being merely held in the hand, and this was a most successful experiment. Mr. Tesla prefaced it by relating a little anecdote of Lord Rayleigh. When he was in London, remarked Mr. Tesla, with much feeling, he had the pleasure of performing this experiment privately before Lord Rayleigh, and he would always remember the trembling eagerness and excitement with which that distinguished scientist witnessed the lamp light up. The appreciation of such men, said Mr. Tesla, repaid him fully for the pains he had been at in working out these phenomena.

In this experiment a number of tubes were taken and flourished or flashed in various ways, and with the current made intermittent at longer intervals by adjusting the spark-gap. Wonderfully beautiful effects were thus produced, the light of the whirled tube being made to look like the white spokes of a wheel of glowing moonbeams. Then some rectangular tubes were taken and flashed or whirled so as to produce curious designs of luminous lines.

A bulb was shown by Mr. Tesla said by him to be so highly exhausted that when the bulb was merely attached to one terminal of the disruptive discharge coil, it would send the sparks across the outside of the globe to the other terminal, which was on the opposite end, rather than pass through the bulb. The bulb in question was painted on one side with a phosphorescent powder, or mixture, and threw a most dazzling light, far beyond that yielded by any ordinary phosphorescence. It was pointed out that there was no difficulty whatever in obtaining powerful phosphorescent effect in this way, and that a practical illuminant on these lines needed merely the perfection of the method of conversion above alluded to.

In conclusion the lecturer made fine cotton-covered wires stretched on a frame over the table luminous so that in the dark they looked like attenuated violet caterpillars yards long; and then within a large rectangle formed by such wires he flourished tubes in the interspace, these tubes flashing with light wherever waved.

After the lecture, so great was the desire of the public to see Mr. Tesla closer, an informal reception was held in the lobby when several hundreds of the leading citizens seized the opportunity and Mr. Tesla's hand in a very vigorous manner.

It should be added that the Electric Exchange of St. Louis presented Mr. Tesla at the beginning of the lecture with a magnificent floral shield, wrought in white carnations with a border of palms and American Beauty roses. It was about four feet in diameter. In the centre was a circle of red carnations bordering a tablet of white ones bearing the

letters in red  $C = \frac{E}{R}$ .

Around the circumference were the floral letters: "St. Louis Electrical Exchange, 1893."

## President Ayer's Address.

At this, our sixteenth convention, it gives me much pleasure to receive you in a city which can display such an appreciation of the work in which we are engaged; to welcome you in my home and be able to present to you the attractive programme that has been prepared.

Since the first meeting in 1885 at our sister city by the lakes, we have spread upon our records evidence of the wonderful progress of the great industry we represent, and while as measured by time the years are few, the progress is marvelous. No art, no industry, no science can compare with it; and in no more forcible manner can it be represented than by stating that there is more capital invested in St. Louis in the application of electricity

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to-day than the sum total of investment throughout the United States for the production of apparatus and its use when this Association was born. These are facts well known, yet hardly realized by those of us who are engaged in promoting this remarkable development. In St. Louis we have installed 266 dynamos in central stations and various private plants, supplying current to 185,000 incandescent and 5,330 arc lamps; a total of 1,800 h. p. capacity of generators, supplying 660 motors for operating almost every character of machinery, and 8,240 h. p. in generators, operating 1126 street car motors over 160 miles of road; and the roads under construction, to be completed within the year, will add 8,000 h. p. in capacity and 96 miles of road. This will make a total generating capacity of 30,000 h. p.

There are nearly sixty square miles of territory supplied with arc and incandescent lights, and which is crossed and re-crossed with electric roads. The changing from steam and cable to electricity for motive power has transformed a bankrupt road into a most valuable property, and successful cable roads are to be changed at much expense to electric, that they may be more successful. This exposition of the development of this industry is what St. Louis has to offer for your inspection.

Since our last meeting much has transpired of interest to the members of the Association. Important developments have been announced from time to time through the press, as the result of the work of inventors, and many valuable items of detail have been brought out to add to the efficiency and satisfactory working of existing apparatus. The commercial development, however, has been confined to improvements in well-known apparatus and not to radical departures in character of generators as many were led to expect a year ago. More light will doubtless be given us in this direction through some of the papers we will be favored with, but there seems to be little likelihood of the introduction of new methods soon which will affect the quality of investments in existing apparatus, though there is reason to expect in the very near future that which will likely solve the problem of long distance transmission in a satisfactory manner. The much desired power motor for simple alternating circuits we are still anxiously looking for, and for some applications such motors as are known to be practical should be produced.

The recent patent decisions have introduced a new condition to many, brought anxiety and trouble to some and satisfaction to others. To those of us who were lulled into security by the tedious delays of the courts and the persuasive arguments of our friend, the salesman, who had so many advantages to offer, comes anxiety. To those of us who have only recently entered the field, and who heard very little of claims for "foundation patents," it is a new condition we can hardly realize, and we doubt its reality; and we are strengthened in our doubt by those who do not want it so. To those of us who consider carefully and believe in the ultimate establishment of the inventors' claims and rights, and who gave evidence in support of this faith by paying, in addition to a fair market price for the apparatus, an additional sum for the right to use it, and who have waited many years to receive the protection we paid for, comes the following satisfaction:

That such a condition as exists to-day can be brought about calls for prompt action, that the rights of the people may be better protected. That the inventor can be so long deprived of his rights that many are led to believe by the delay that he has none, and to such an extent that millions are invented in developing a business made possible by his invention, without regard to his claims, is clear evidence of the need of reform in our laws which will provide adequate protection for the inventor, as well as the inventor; and we earnestly recommend some action on the part of this Association, that our properties which have been so long regarded with distrust and suspicion by the financial world may not have added to their burdens the question of their right to use devices which are vital to their success; and to so place the station manager that he must not add to his other essential qualifications that of being able to divine what the courts may do in the far future. At previous conventions this topic has been considered and efforts made to have Congress take such action as would give relief. Work in this direction should be taken up again by this body and vigorously pushed to completion.

I note with much pleasure that since our most interesting and delightful visit to Montreal, most rapid advancements in electrical interests have followed, and that the Canadian Electrical Society has at a recent meeting given much evidence of remarkable growth. That, with the greatly increased business of our electrical manufacturers, notwithstanding the protection wall over which their "heavy" products have to be lifted, indicates that our time was well spent; that there was devel-

oped a friendlier feeling and closer intimacy, besides giving an impetus to electrical development for which they seemed to have been waiting. I believe our visit has done much to hasten the time when there will be no wall between one country and one people.

The preparation for the World's Fair is rapidly nearing completion, and in a few short weeks there will be opened to the visitor one of the most magnificent achievements of modern times—an engineering and architectural wonder. In no particular is it more remarkable than in the department of electricity. This in its ramification permeates all departments and will make possible most marvelously beautiful effects, as well as prove the most useful of servants. Too much praise can not be awarded those who have labored to produce this most complete exposition of the development of the science in all its forms.

The American Institute of Electrical Engineers is doing much to assist in the arrangements for a fitting meeting of the electricians of the world, and our committee will present a report which, with the information received from a representative of the World's Fair, will enable us to act in the best manner to show the national and patriotic character of our organization.

In the past year much work has been accomplished by our secretary, and the showing for the year will, I feel, be very satisfactory when his report is read. Three volumes of the association's proceedings have been edited, published and delivered to members within the year, bringing this work down to date. Because of the accumulation and the large amount of matter contained in each volume this has been no small task, and the creditable results obtained in the handsome volumes, together with the thorough manner in which the office has been conducted, make it but a simple act of justice that I express my thanks and commendation at this time.

The interest in the proceedings of the convention evinced by the educational institutions throughout the country is one of the encouraging signs of the times, and justifies the statement (which is evidenced in many other ways) that the power and influence of the association are extending. The increase of membership is flattering. With this condition existing there will come up for your final consideration the question relative to the reduction of dues. While present conditions indicate that we can with safety reduce our dues, and possibly increase the membership beyond its natural growth under the present rate, yet there is much work which can be carried out to the benefit of the association which would have to be neglected if our revenue is reduced. The dues at present are hardly a burden, and a balance on the right side of the ledger is essential to the prosperity of any institution. While a change in the dues would not affect our treasury for more than a year, during which there will be extra expenses on account of the meeting which will necessarily have to be held in Chicago, I do not think it wise to reduce them at present. This question I trust will receive due consideration before action is taken.

From the beginning until to-day every producer and operator in the electrical field has had before him the serious problem of how to get men sufficiently skilled to execute in a satisfactory manner the duties assigned them. Undoubtedly this business has attracted in all departments the most ambitious elements from other lines of work, but as we can all testify, their education in the new field has been enormously expensive to their employers. But the future outlook is promising. While within the past three years this army has more than doubled, and the new element had little or no previous training or knowledge of the work, yet there have been established more rapidly than ever clubs, societies, trade guilds and labor organizations, with the principal avowed object of self-education. Their objects and efforts in this line are to be commended, and form a pertinent topic for this body to consider. In St. Louis we have among societies of this class, an organization known as the Electrical Exchange, composed principally of contractors whose particular business is to do electrical construction required in all modern buildings. Their prime object in organizing was, that the execution of this work might be confined to those who were responsible and maintained regular establishments. Their endeavor is to so execute the work entrusted to them that they may command the respect and confidence of the central station manager, owner, architect and builder. To this end they meet for discussing improved methods, and such other matter as may be suggested and calculated to be of mutual benefit. Insurance inspectors, supply houses and central station companies are eligible to membership. In contact with them we find them ever ready to coöperate with us in any movement to improve the service and increase the satisfaction of our customers; and since their organization a

much better feeling has been established and the quality of work greatly improved.

Within the past year has been organized the National Association of Electrical Workers, with headquarters in this city, and having branches in many towns and cities. This organization is largely composed of linemen, though it expects to embrace in its membership electrical artisans or workers in every department. Their principal object is, as stated, in the first number of their journal, to band themselves together for mutual education and improvement; to establish rooms and provide instructors, and adopt such other methods as may improve the standard of electrical labor. This organization is capable of accomplishing a vast amount of good, if maintained on the high plane outlined. If the effort is earnest and honest we can all lend them a helping hand and will do it gladly. The wage question will never be an element to make a breach when the rank and file of electrical workers have mastered their business. But until that time arrives those who are among them as leaders should keep in mind that satisfactory work, performed in a conscientious manner is the first essential to pleasant mutual relations between the employer and the employed, as well as the strongest lever to raise wages that can be produced.

Thoughtful care on the part of the manager must be given that the man who climbs the pole to clear a ground or close a circuit, in the sleet and rain, and all others as well, be protected by all safeguards in the way of instructions and appliances that can be suggested. The engineer, the dynamo tender, the lamp trimmer, all must be encouraged in their efforts to improve in knowledge, by active coöperation on the part of the management. A clear acquaintance with our employes is an essential to a full appreciation of their services. Many acts of heroism are performed by the lineman or the dynamo tender, in order that the service may not be interrupted, and that, many times, without a passing mention. We can shake out the crosses and clear the grounds by a closer acquaintance with our men and their work.

#### Report of the World's Columbian Exposition Committee.

The Paris Exposition of 1881 was lighted in part by 1,383 arc lights, and was the first arc-lighted exposition. The Louisville Exposition of 1882 was lighted by 5,000 incandescent lights of 15 c. p. each, and was the first use of incandescents for exposition lighting. The New Orleans Exposition was lighted by both arc and incandescent.

The Paris Exposition of 1889 made the largest use of electricity up to that time. There were for public lighting service 1,093 arcs and 8,837 incandescents. For private lighting there were used 623 arcs and 4,010 incandescents. The total of the service installation aggregated 3,125 h. p. capacity, and with small installations, the grand aggregate capacity reached nearly 4,000 h. p. There was practically no use made of electricity as a motive power.

The World's Columbian Exposition has placed contracts for 4,500 arc lights, of 2000 nominal c. p. each, and received donations from miscellaneous exhibitors of about 700 hundred additional. They have placed contracts for about 80,000 incandescent lights and received donations as special exhibits of about 10,000 additional. They have placed contracts for 2,900 h. p. capacity of power generators and received donations of 1,600 h. p. capacity. They have made contracts for electrical fountains requiring an installation of 900 h. p. capacity. The aggregate of power generators and fountain plant (the latter will be used particularly for charging the storage batteries of the electrical launches) is 5,300 h. p.

The total aggregate of the electrical installation therefore amounts to 19,500 h. p. The total aggregate of boiler capacity employed is 18,000 h. p. on the standard rating of 30 pounds of steam per horse power per hour. With such efficiency as should be expected from the engines installed, this represents an effective total of about 24,000 h. p.

The most interesting point of this plant will be the use of oil as a fuel. From the time the crude petroleum is emptied from the railroad tank cars into the World's Fair storage tanks, at the extreme southeast corner of the grounds, this oil becomes part of the power plant, the pressure upon the delivery pipe being automatically controlled by the steam pressure in the boilers. Delivery to boilers is made by pipes laid underground from the storage tanks to the boiler house, and the oil is introduced into the furnace in an atomized jet.

A point of exceeding interest in the engine and dynamo room will be the very large adaptation of dynamos to Corliss and medium speed types of engines in direct-connected combinations. The

largest of these will be a set of vertical triple expansion engines with two connected armatures. At 60 pounds steam pressure this single unit will give most economically 1,200 h. p., with a capacity for continued service of 1,500 h. p. output.

Next to the universal distribution of electric power for all points of the grounds, the most marked advance of the time is the application of electricity to the transportation service of the Exposition. This service will be by a three-mile double track elevated railroad following all the precedents and best practices in block signalling systems, power brakes and all other safeguards of the modern steam railroad used in exclusively passenger traffic. The entire operation will be, however, by electric power drawn from an independent power plant of more than the aggregate capacity installed at the Paris Exposition. In this power house will be found the latest examples of the large range of direct driven power generators, five in number, and aggregating 3,500 h. p. capacity. To those who have not had an opportunity of informing themselves of the part that electricity is expected to play at the Exposition, these figures will be interesting and will indicate to all how much greater by comparison with preceding expositions the Columbian Exposition is bound to be.

The sensational reports telegraphed from New York that many of the prominent electrical firms in that State had decided to abandon the space allotted to them and make no exhibit, were found on inquiry to be based on the fact that three small concerns had gone out for reasons that were personal to them. Every foot of space in the great building has been taken and every electrical concern of any consequence in the world will be fully represented. The active work of preparing for the exhibits has been going forward for some weeks and many of the electrical firms have made substantial progress in the erection of their booths.

The intellectual programme to be carried out under the auspices of the World's Columbian Auxiliary promises to be of remarkable interest. As you know, Prof. Elisha Gray is at the head of the electrical branch and he now has assurance that the gathering of electricians from all parts of the world will be a grand one.

Respectfully submitted,

R. E. SUNNY,  
Chairman.

### Relation of Insurance to Electric Lighting and Power.

[By Capt. Wm. Brophy.]

This subject has been treated so often and by so many able men that I have grave doubts as to my ability to add anything to what has already been written and said that will be of interest to you.

It has been my good fortune to be in a position to witness the early attempts to introduce the electric light, and the attitude of the insurance companies and their agents, as well as State and local boards.

To say that they receive this new form of illuminant with unmistakable manifestations of welcome would not be in exact accordance with the truth. Those who were disposed to give it even a half-hearted welcome were very few, while those who receive it as another element of destruction of property and insurance dividends were largely in the majority.

To say that they were entirely unjustified in their lack of cordiality for this new application of electrical energy, that was destined to reverse the regular order of things as they have existed since the creation, by turning night into day and rendering us independent of the silvery but uncertain rays of that shining example of reflected brilliancy, the moon, would be far from true.

The average citizen, upon witnessing for the first time the brilliant arc as it leaps from point to point of the carbons, would not divest his mind of the feeling that this mysterious force was attended with more or less hidden danger. He naturally reasoned that if it could produce this most brilliant light, and heat enough to melt the most refractory substances, it might easily get beyond human control and start incipient conflagrations simultaneously at numerous points in its path, that might destroy not only individual blocks, but wipe out entire towns and cities.

To say that this feeling of distrust of this new form of illumination did not take deep root in the minds of the fire insurance fraternity would be to claim that they were out of place on this planet of ours, and should not be classed with ordinary members of the human race. They are not and do not claim to be other than ordinary mortals, and should receive the same indulgence that others receive from you whose fears have led them to oppose the introduction or extension of the electric lighting systems.

Those engaged in the insurance business and those engaged in the manufacture and sale of electric lighting apparatus, as well as those who furnish electric light and power, have one common end in view, viz.: to secure at least a fair return on the capital invested in their business and for their own time and labor. Each of these interests needs the help of the other, and there is no good reason why one should antagonize the other. That this has been done in the past I will not deny, but to say that the insurance companies were wholly to blame for their hostility to the introduction of the electric light would be manifestly unfair, to say the least.

Insurance companies have paid dearly in the past for the mistakes of those engaged in the introduction of all modern forms of artificial illumination and many forms of heating, a few of which I will here enumerate.

Since the days of the tallow candle and whale oil lamp we have had gas, camphene, burning fluid (rightly named), kerosene, refined petroleum and its products—naphtha and gasoline—some of which have caused enormous losses by fire to the owners of property and insurance companies, and the loss of thousands of human lives.

Camphene and burning fluid were, in due course of time, displaced by kerosene oil, which was produced by the destructive distillation of coal. This in turn gave way to petroleum and its products—naphtha and gasoline—which still hold the field, furnishing a cheap and fairly good light, increasing the number of fires and causing heavy losses annually to insurance companies. To such an alarming extent did these losses grow after the introduction of the products of petroleum for the purpose of illumination that legislative action had to be invoked to regulate the manufacture, storage and sale, and establish a standard of safety therefor.

After these costly experiments, was it to be wondered that the insurance interests should view with mistrust this new and mysterious force, electricity, when the attempt was first made to work it in harness to furnish light?

It may be said that they should have familiarized themselves with the new element and learned how to keep it under control. The answer to that might be: To whom were they to apply for such information? Those in the electric lighting business were not overburdened with a knowledge of this subtle force, and they, being but human, could not be expected to admit, if they believed it, that it would increase the fire hazard at all, for such an admission would arouse the antagonism of the insurance companies and prevent the growth of their business. With the crude methods at first employed for the transmission of the electric current from dynamo to lamps and circuits, fires of more or less magnitude were quite frequent, with consequent loss to the insurance companies. These unfortunate happenings did not tend to cause them to look upon this new candidate with unqualified favor. On the contrary, many were inclined to look on buildings equipped with electric lights as worthy of a place on the "prohibited list," while others viewed them as extra-hazardous and not to be eagerly sought for by local or special agents, even at a very high rate of premium.

But in spite of the evident hostility of this powerful combination, the electric light made slow but steady progress in the good graces of the public, and, while looked upon as being capable of doing more than its share to reduce dividends on insurance stocks, yet it has gained somewhat in favor with them.

How to deal with this new, and, to most people's minds, dangerous element was a most serious question with the underwriters of this country. To many it seemed best to increase rates all along the line where it was introduced, and thus prevent or discourage its use. Had such action been taken there is no doubt but it would have had the effect of retarding the growth of the electric lighting business very greatly indeed. Fortunately, this last expedient was resorted to in only a small portion of this country.

In that little corner of our great and glorious country known as New England the insurance organization known as the New England Insurance Exchange was most fortunate in its selection of a chairman for its then new committee on electric lighting. He found time while performing his regular duties as a special agent to post himself in the mysteries of dynamo electricity, and as his knowledge increased his friendship for this form of illumination and those engaged in producing it increased in like proportion.

The task of determining the best course for the underwriters to pursue toward it was no easy one for those who undertook it. Fortunately, they were conscious of their own inexperience and inability to give instructions until they had devoted a sufficient time in observation and study of the subject. This information was accepted, not only from the most eminent men, but from those occupying the most humble position in the business.

In this way the inspector, instead of assuming a knowledge which he did not possess, for the sake of increasing his own importance in the eyes of those who employed him, kept in touch with those whose daily experience enabled them to detect any inherent weakness in the devices and systems of transmission, and enabled him to assist in perfecting the same by advocating all improvements that increased the safety and did not impair the efficiency of the system. In this way the standard of safety has been raised to a degree that approaches perfection.

In this way fire losses caused by electric currents decreased, notwithstanding the enormous increase of electric light, power and railway business, and the fears of the insurance companies were in a great measure allayed. In marked contrast with this mode of procedure is that of certain insurance inspectors and others who are now engaged in an attempt to undo all that has been done to bring about an era of good feeling between these two great interests and enable them to work together harmoniously.

This attempt at mischief making is all the more reprehensible, owing to the progress that has been made toward harmonious relations at a meeting of your representatives and those high in the councils of insurance associations. With the exception of one or two of those present at that meeting, all expressed themselves in the most friendly terms toward those engaged in the electric business, and desired to cultivate a feeling of friendship.

To those inspectors who are engaged in an attempt to throw discredit on those engaged in the electric business, by practically saying "You are not to be trusted," I will say, beware, the electric industry is not the puny infant it was some ten years ago. Millions are now invested in it, while the phenomenal growth of the electric railway challenges the admiration of all, and it is fast attaining the vast proportions of the electric lighting industry. These joint industries will submit good-naturedly to all reasonable requirements exacted by your employers, but they can not be expected to submit to continual annoyance or admit that they are unable to conduct their business much longer by those who seek to do so by might and without a shadow of right. The electric light business can exist without the fostering care of these self-appointed guardians, who seek to magnify their own importance by throwing discredit on this association. Because they are tolerated, they must not seek to dictate, as there is a point beyond which forbearance ceases to be a virtue with all classes, and electric lighting companies do not differ materially from the rest of the human family in this respect.

Having given you a little of the early history of the combined efforts of those who sought to make the electric light safe in its early days, and pictured some of the obstacles that had to be met and overcome, I will try to point out the best methods to pursue to stop the silly twaddle about the dangers of electric lighting by professional agitators, sensational newspapers and timid old ladies of the male persuasion, and deprive the smart (?) insurance man, who insists that there are hidden dangers contained in every portion of the plant, that compel him to charge an increased rate of premium for its production and use, of his stock in trade.

The published opinions of some of these gentlemen who do business in that smart little city sometimes known as the "Hub of the Universe," that has suffered quite recently from an unusual number of very large fires, as to the part that electricity has played in causing the same would polarize a dynamo and paralyze its owner.

A few choice quotations are here appended: "The Remick fire was caused by electricity." "I think there is an epidemic of fires, as in 1872, and insurance companies must yield gracefully to the inevitable. Still, it is obvious that they must have more money, and that those trolley wires must come down." "Many who were not willing to be quoted assigned the electric wires as the cause of much of the fire loss, and claim to see a connection between the growth of the fire loss and the growth of the use of electricity in the same district."

The men mentioned in the last paragraph are to be commended for their modesty in not wishing to have their names handed down to posterity as the wise (?) men of the "modern Athens."

In the city of Boston, mind you, the Board of Underwriters have for a number of years maintained a system of electric light inspection, paid for by assessments levied on electric lighting companies, also on firms and individuals engaged in electric construction. The city is compelled by State law to maintain a similar system of inspection. In addition to this, one of the electric lighting companies, whose officers are not possessed of an abiding faith in either of the above named systems of inspections, makes it a point to inspect all wiring before they will connect thereto.



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Yet with all these safeguards and checks on those engaged in electric lighting and construction, those men "claim to see a connection between the growth of the fire loss and the growth of the use of electricity."

The real fact in the case is that millions of insurance has been placed by the agents and brokers on property that is far more hazardous than the very poorest electric light plant in the business portion of the city in question; ordinary prudence having been thrown to the winds in writing such insurance. The inevitable consequences of such folly ensue, viz.: disastrous fires. The agent who sees a possible loss of commissions hastens to give a plausible excuse to his companies, by charging the origin of the fires to electricity and demands an investigation of the fire department for not extinguishing them before they were kindled, concealing the fact that his own methods of placing insurance encourage incendiarism and promote carelessness.

In view of the fact that it is now proposed to add a small charge to the rate of insurance where electric lights "are installed in compliance with board rules and specifications," and a charge of 25 cents where they do not meet with the approval of the insurance inspector, I would advise you to pursue the following course:

Where a company does its own wiring for its customers, proceed with as much care as though the building in which you are installing wires and fixtures was your own and you had no insurance on it. Where the work is done by others, inspect every foot of wire, every joint, cut-out, switch and insulator, and on no account turn on current until you are satisfied that it is as safe as it is possible to make it. Do not rely on the uncertain movements of the insurance inspector or any other system of inspection that too often fails to inspect. You are the one whose business will suffer from the bad effects of fires caused by defective wiring.

We now come to the electric light station. Do not rent one end or the basement of a flour, saw or planing mill, and place your machinery in it and expect to get any better than the rates charged on the buildings named above. While they are considered extra hazardous risks, insurance boards in their wisdom (?) will tell you that the introduction of electric light machinery increases the hazard and also the rate. This statement may cause you to smile, but there are those whose early experience have found it no laughing matter.

Do not place it in some old abandoned building, for, as in the above case, an increase of rates will follow. Do not set your machinery down on the ground and build a tinder box around it, for besides assuring high rates of insurance it does not speak well for the business sagacity of the owner.

Proceed as though you proposed to do a legitimate business and for all time. Build your station on solid foundation, the walls of brick or stone, not over two stories high—better only one—solid brick or stone foundations for engines, boilers, dynamos and pumps; a solid brick wall extending three feet above roof between boiler and engine room; the floor of boiler room of brick, stone or cement; if building is two stories high, have the boiler room the same, having clear, open space between floor and roof; floors of engine room, if dynamos are not placed therein, can be of iron or stone; if dynamos and other apparatus are in the same room, floor should be of three-inch plank, tongued and grooved, with hard wood floor of one-inch boards, matched and laid at right angles to, or diagonally on, the plank, the whole laid on heavy square timbers or iron I beams; the roof should be of three-inch plank, splined and grooved, resting on square, hard wood timbers or trusses or iron I beams; cover this with slate, tin or gravel, according to pitch; leave the walls bare; do not attempt to improve their looks by covering them with wood and creating concealed spaces; roof and ceiling ditto; inclose stairways with plank, and provide self-closing doors therefor; cover the doors in brick partition walls with tin; also the frames; do not build a wooden hen-coop or Turkish pagoda on top of roof, and call it a wire tower; build from floor of dynamo room, of brick or tile, a good substantial tower, of ample size for all wires; put them in systematically and not by guess; make switchboard of good, hard, well seasoned wood, skeleton in form, or use the sides of brick or tile tower; if slate switchboard is used, bush all holes through which wires, plugs or other connections carrying high potential currents pass with glass porcelain or hard rubber; do the same if sides of brick wire tower are used; use the same material where wires pass through floors or other woodwork; secure a supply of water for protection against fire from town or city mains, if available and pressure is sufficient. In doing this have pipe leading into station of ample size. It costs no more to excavate for a six-inch pipe than it does for a one-inch, and the difference in cost of pipe is not enough to outweigh the value of an abundant water supply in

case of fire, for, like the Texan's revolver, then is the time when you want it and want it bad. If water can not be secured in this way, make your boiler pumps sufficiently large to throw, when connected together, or working singly, from three to five hundred gallons per minute, according to circumstances. Remember that all electric apparatus, including dynamos, is very susceptible to damage by fire or water, and by reducing the amount of combustible material in your plant you reduce the possibilities of a large fire and the necessity for a large amount of water.

Do not, if possible, build your station adjoining or too close to such risks as oil refineries, planing, saw and flour mills, grain elevators, etc. If obliged to do so, have no, or as few, openings as possible in the exposed side or end, and provide metal covered shutters for these few. Run all your wires in plain sight, leaving ample space between them.

In planning your station, allow for future growth and enlargement, without disturbing the present arrangement of machinery, etc. Store your oil, and, if possible, your other supplies, outside the station, and if you have a repair shop, do not have it in the second story, attic or basement. It is much better outside the building. If you must have it in the building, do not box it up out of sight, but separate it, if you must, by an open partition or fence from the rest of the building.

Divest your own mind of the idea that dirt, grease and slush must be the wedded partner of an electric light station, and impress on that of your employees that an absolute divorce must be granted if the marriage ceremony has been performed. "Cleanliness is next to Godliness," but nowhere does this maxim apply with such force as in an electric light station.

Having finished your plant in accordance with the foregoing requirements, you need have no fears of acts of unneighborly conduct or apparent neglect of your property by the ever active insurance agents. Instead of waiting for you to seek them out and beseech them to insure it, they will be as attentive to you as the most ardent young suitor ever was to his lady-love. Remember that so-called tariff rates and agreements, that hold insurance associations together for the purpose of maintaining high rates, are but ropes of sand, and that keen weapon—active and oftentimes bitter—competition, is continually cutting it up in little pieces and letting this craft, that should be rightly named "Trust," drift on the hostile shore of independent action.

### Underground Conduits and Conductors, and the Experiences of Electric Lighting Companies of New York City.

(Read before the National Electric Light Association, at St. Louis, Mo., by Wm. H. Browne.)

Those who are intimately acquainted with the histories of the electric lighting companies of New York City may be pardoned if they believe that the experiences undergone by these companies have been unique, and that they afford to companies elsewhere opportunities for beneficial consideration.

At the risk of presenting some incidents having the aroma of antiquity, or being tedious by the recital of what may, perhaps, now be considered well-worn tales, attention is invited to a statement as brief as possible of the story of electric lighting in New York City from the beginning to the present time.

In the years 1880 and 1881, but 12 or 13 years ago, two companies began in New York City the business of distributing electric current from central stations for public and private illumination, the one using the Brush, the other the United States system of arc lighting.

They were the pioneers, at least in that city, in the business of electric lighting. They were provided with apparatus, which, compared with present standards, would be considered totally inadequate to the designed purpose. They were obliged to undertake the operation of such apparatus with employees who were necessarily ignorant of its construction and methods of use. They had also to encounter an atmosphere of mystery in which the electrical business seemed to be enveloped, and which was intensified by the pernicious ideas of those who had learned, or believed they had attained some knowledge of it, that their personal advantage and preferment was obtainable only by secluding to themselves such information as they believed they had acquired. In brief, these companies experienced to the utmost all the trials and difficulties belonging to those who begin in new and untried fields.

Coincident with this imperfect apparatus and the other difficulties alluded to, the best medium then obtainable for the transmission of current of high potential was bare wire.

Contrast that means of transmission with what is now deemed requisite.

The first step from that bare wire towards the underground conductors of to-day was soon found necessary.

That necessity developed the cotton-covered wire, and with that the operatives felt safe from injury by shock.

Soon some protection from the conveyance of fire by the covering became necessary, and then followed the saturation of the cotton covering with lead. This proved so equal to the conditions that the Fire Underwriters, in the interest of insurance companies, formulated rules prohibiting the use of any other but that wire, which obtained their own name of "Underwriters." With this progress in the improvement of the conductor, improvements in the apparatus and appliances brought them to such a condition, that, coupled with the knowledge acquired by the operatives in handling them, and the most scrupulous supervisory control of the lines, it became possible to pass through one entire night occasionally without having lights out, or a "dead ground," or "short circuits," and that was a night to be inscribed upon the archives of the companies as an occasion from which to date progress towards the next improvement.

It will, no doubt, seem to many of you who have not had personal acquaintance with similar conditions, incredible that capital could have been invested and efforts exploited in a business conditioned as this was in those days; but the above statements are merely the baldest facts and could be amplified by numerous incidents in testimony of their strict accuracy.

However, the companies struggled with the conditions; they sought and used all the improvements obtainable and finally were able to give tolerably consecutive service, with the result that a few customers began to use the light and were willing to pay a fair price for it, 75 cents to \$1.00 per light per night.

But the extension of the use of electric illumination was not so rapid or so widespread as to call for many wires or very large poles. The operators of the company had not had such strong pecuniary inducements as to justify them in being very enthusiastic in looking to the possibilities of the future.

They felt justified in restricting their efforts to satisfy such demands as were made upon them, and whenever a customer was obtained beyond the limits of the wires already erected, the lines were extended with the least possible expense.

The poles used were ordinarily 6 to 8 inches in diameter at the base, and 20 to 25 feet high, provided usually with a four-pin cross-arm. A few of these poles have remained and are in existence at the present day.

In the year 1884 manufacturers of other apparatus saw in New York City a field of profit and advancement for their machinery. New York was the largest and richest city of the United States; the companies then doing business in that city were actually on the verge of paying dividends; and it could not be considered proper in the interest of the public that they should continue to have a monopoly; investors were sought and assistance obtained toward the creation of other companies who would utilize their apparatus and reap great profit in the furnishing of electric light to the citizens of that great city. The result was that in the year 1884 franchises were granted to no less than six other companies, all of them primarily intended for arc lighting. Some of these companies, taking note of the numerous poles that were in existence for the telegraph, telephone, police and fire department service, deemed it uneconomical to erect poles for their own wires, but arranged with those having charge of such poles for the attachment of the electric light conductors on those existing poles. Some of the companies created in that year did not make rapid progress, and the increase of poles and wires for electric lighting was not materially appreciable until 1888.

During these years, however, the wires for telegraph, telephone, messenger service, police and fire alarm had increased rapidly and become so numerous and filled the air with so many strings of iron, that the public became offended, and bills were introduced in the State legislature looking to the burial of those wires. The electric light wires were so few as to be scarcely noticeable and did not attract attention.

In 1884 a bill was passed in the legislature directing that the wires be removed from the streets before the first day of November, 1885, but it provided no means to insure their removal, nor penalties for non-removal. The legislature of 1885 having found that the previous enactment had accomplished nothing, passed another act which provided "that if no suitable plan should be proposed for placing the said wires underground, it should be the duty of the said Board of Commissioners to be caused to be devised and made ready for use, such a general plan as would meet the requirements

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of the said acts of 1884-5, and that the said board should have full authority to compel all companies to use the subways prepared." Under this act the Subway Commissioners who had not been provided by the act with funds wherewith to carry out the object named in the act, deemed it wise in order to carry out the purpose of the enactment, to make a contract with some company to build the subways, and did make such contract in 1886.

Persons interested in the telephone company realized that the purpose of the act would inevitably be carried out; and as the interest of that company in the fulfillment of such purpose would be affected to a greater extent than any other, except possibly the telegraph company, they deemed it prudent to become interested in the company with whom the Subway Commissioners had made the contract for the construction of subways. This secured to the telephone company a right-of-way of almost incalculable value. Even at that time the place and method of the burial of electric light wires was scarcely considered. Some approaches were made to the two old companies engaged in electric lighting, as to their taking upon themselves the task of building subways for electric lighting purposes, but they, it appears, chose to refuse to entertain the proposition. If they had decided, as did the telephone company, it is very probable a different condition would now exist in the electric lighting business in New York City.

In 1888 began the introduction of the alternating system of incandescent lighting. Until that year electric lighting had been confined almost exclusively (of course, outside of the low tension company) to arc lighting; and the increase in the business to that time had not required the multiplication of wires and poles to any considerable extent. In 1888, however, four companies began a spirited effort for the introduction of incandescent lighting, with the result of contracting for upwards of 60,000 lights within less than a year. This caused a considerable increase of wires. The wires were strung principally upon the poles previously in use. Comparatively few new poles were erected until, in the latter part of 1888, the Board of Electrical Control, recognizing the increase of electric lighting, formulated rules for the extension of that business by means of overhead construction, and in order to provide the best possible overhead construction, prescribed certain requirements on which, with the immediate supervision of the Board of Electrical Control, what has probably been the finest line in the world, was erected. It was considered an ideal line. It consisted of poles 85 feet high, 16 to 20 inches in diameter at the base and not less than eight inches at the top. On this line were strung something like 150 wires—none less than No. 4—the majority No. 2. The poles were made tall so that the wires might not interfere with the operations of the fire department; and if breaks should occur between poles the wire could not reach pedestrians, and also to avoid the numerous crosses with the other wires, which were the source of much trouble. To further secure these results, the cross-arms were placed at the highest part of the poles. Experience soon suggested that this mass of weight must be removed from the top, and they were carried down some 15 to 20 feet. This precaution was, however, not sufficient, as, in December, 1891, a section of that line, about a mile in length, fell into the street.

During 1888, the companies having aerial lines in upper Broadway, the principal thoroughfare of the city, were directed to place cables in the conduits which had been prepared in that street, and to remove their overhead construction.

But the companies objected strenuously.

They declared vigorously that it would be impossible to operate currents of high tension underground.

They were supported in this connection by professors and others learned in the art.

They appealed to the court to be sustained in this position.

The then Mayor of the city, also, by virtue of his office, President of the Board of Electrical Control, agreed substantially with the companies and opposed his fellow members.

The controversy became heated and to a great extent personal. In fact so much so that the Mayor refused to sit with the other members of the Board of Electrical Control.

The courts declared that the law gave to the Board of Electrical Control the power and the right to decide whether the subways were fit and proper for the purpose, and ruled that the companies must comply with the law and occupy their subways with their cables and remove their overhead construction.

In August, 1888, the first effort was made to use the electric light subways on Broadway from 14th to 35th streets. The Subway Company had invited the companies to make the experiment of operating high tension current underground, and offered the use of the subways without rental for the

experiment. The first cable was placed for arc service and consisted of eight conductors, insulated from each other and enclosed in lead armor. The experiment with this was not successful. The cable did not meet the requirement of the Board of Electrical Control of an insulation resistance of fifteen megohms per mile for each 100 volts for each conductor. This result seemed to verify the claims of the companies that arc lights could not be served from underground conductors under the conditions imposed and existing.

The opposite view was maintained however, by the Board of Electrical Control and its contractor company, and the courts having held that the law accepted no other decision than the opinion of the Board, the companies were threatened with the removal of their aerial wires in the localities provided with subways, whether they placed cables in the conduits or not.

The year of 1890 brought a new mayor and president of the Board of Electrical Control. He immediately promulgated the order that within 90 days the wires must be removed by the companies from streets provided with subways or he would exercise the right given by the law to have them removed by the city.

At that time two other companies undertook to make a test, one to the extent of one block on 125th Street, the other of a circuit of 21 blocks on Broadway and Sixth Avenue for ten arc lights.

Controversies and contentions between the companies and the authorities had become so animated that the companies were not credited by the authorities with being disposed to have the experiment succeed, and although they laid their cables with all attainable speed, and were successful in the tests and announced their intention to occupy the subways as rapidly as they could, no extension of the 90 days' time was granted, but on the 5th day of April, 1889, the authorities began the cutting down of the electric light aerial lines on Broadway and Sixth Avenue, where the subways had been provided.

This action aroused great excitement in the public mind, and the authorities were applauded by the newspapers for their vigor. The occurrence of several accidents, principally to employes, working on overhead lines, added opportunity for furtherance, by sensational articles in the newspapers, of the excitement, so that the Board of Electrical Control, who, in the preceding year had devised the rules under which the large line heretofore referred to was erected, and who had supervised its construction and believed that by it they had found a way to provide for the extension of electric lighting and carry out the provisions of the law under which they were established, without excessive construction of subways, objected wholly to the use of aerial lines for electric lighting purposes, with the result that in October, 1889, they declared destruction practically to all the lines in the city, except the one built under their guidance the year before, and ordered the construction of subways with what can now be undoubtedly considered erroneous judgment and with undue precipitation.

Concert of action between the authorities and the companies, careful deliberation of the probable requirements and the energy which makes haste slowly but correctly would not have produced, it is true, the removal of the overhead lines to the extent that was accomplished within practically two years; but also it would not have produced the extraordinary expenditure of money both by the Subway Company and the electric lighting companies, nor the loss of business and disturbance that occurred to the companies; but it is fair to presume that a somewhat different condition of the subway situation and of the electric light companies would have been effected with material benefits to all financially interested.

There have been built for high tension electric lighting 600 miles of ducts; of this about 260 miles, or 42 per cent, are rented by the companies. Included in the amount stated as rented by the companies are about 50 miles not occupied yet with cables. These ducts so rented and not occupied are the result of a rule passed by the Board of Electrical Control in 1890, in deference to the wish of the Department of Public Works, that wherever streets were to be repaved, subways must be built previous to the paving, or they would not thereafter be allowed, and companies failing to make application for conduits in such streets at that time would be deprived forever after of the opportunity of obtaining accommodations in those streets for the transaction of their business. They were further required, in making application for such accommodation, to give a bond securing the occupancy of and payment of rental for such ducts as were so constructed for five years from the date of completion. This rule was subsequently enacted into a law by the Legislature. Under that rule the companies applied for the construction of sub-

ways in anticipation of the future, and not for immediate need.

At the present time there are, therefore, occupied with cables only about one-third of the ducts built. Instances of subways built in excess of requirements as developed to the present date may be noted. On Broadway there are 200 miles of ducts, of which but 80 miles are occupied; on Third Avenue 142 miles, but 41 miles occupied; on Twenty-third Street 31 miles built, 11 miles occupied; on Twenty-ninth Street 28 miles built, 17 miles occupied. It may be considered a very reasonable calculation that the increase in the occupation of subways on these streets will never require all the ducts built.

The 600 miles of ducts occupy only 78 miles of streets. The number of miles of ducts, therefore, in any street occupied with cables averages less than three miles. With the 600 miles of ducts now built distributed in this ratio, nearly 200 miles of streets would be provided with subway accommodation, and the extent of the territory available for the development of the business enlarged to three times its present area. Of the 600 miles of ducts, 454 miles were built prior to the year 1890, and included in that construction were the streets above recited, in which continue to be so large a number still unoccupied.

During the last year, 1892, 24 miles of ducts were built, occupying nearly  $10\frac{1}{2}$  miles of streets, or an average of two ducts per street.

If the work could be begun now, in the light of present experience, the average number of ducts per mile of street would not probably exceed three. For all kinds of service, one duct will provide ample accommodation in the greater portion of the city.

The 200 miles of ducts occupied with cables are confined to the 78 miles of streets, and contain for main cables about 600 miles, or nearly eight miles of cable per mile of street, and an average of three cable per mile of duct occupied. About 320 miles are used for arc circuits and 280 miles for incandescent circuits.

These cables represent in many instances the occupation of a given street of ducts by each of four separate groups of companies, all seeking business and having customers in the same street and often in the same block.

But for this quadruplication of occupancy, the mileage of cables at present in use would provide current in a much greater mileage of streets, and to a larger number of customers.

The cables are divided into 81 circuits for arc lighting and 50 circuits for incandescent lighting, all the latter being used for the alternating system. One of the arc circuits is about 15 miles in length, several are about 12 miles long, 18 are longer than 8 miles each, and 40 over 4 miles; the average however being less than 4 miles. The incandescent circuits average over  $5\frac{1}{2}$  miles each.

Connecting these main lines with the premises of customers through the subsidiary subway connections are about 150 miles of cables, so that the aggregate mileage of cables underground is about 750.

The 81 arc light circuits supply about 5000 arc lights, or an average of about 60 lights per circuit, and an average of about 15 arc lights per mile of cable.

The incandescent circuits supply about 90,000 incandescent lights, or an average of about 1800 lights per circuit, or about 320 lights per mile of cable.

In the operation of these 750 miles of cable there have been manifested during 1892 faults of all kinds to the number of 49. Faults are reported to the Subway Company as soon as discovered. As access to the ducts can not be had except under the supervision of the employes of the Sub Company, it must be assumed that all faults discovered are reported. Faults are classified under three heads: "Low tests," "Grounds," and "Burn-outs."

"Low tests" are discovered in the tests which are required weekly of every circuit, and mean that the insulation resistance of the cables has fallen below the minimum of 5 megohms per 100 volts per mile, below which it is not permitted to operate a circuit until the fault has been ascertained and remedied. The number of "low tests" for the year were five on arc and six on incandescent circuits. The "low tests" were discovered to be in the terminals, one being on arc the other on an incandescent circuit. The cause of three "low tests," one on an arc and two on incandescent circuits were discovered to be due to bad joints.

"Grounds" were discovered 16 times on arc and eight times on incandescent circuits; eight of the "grounds" on arc and one on incandescent circuits were discovered to be in the terminals. The cause of three "grounds" on arc and one on incandescent circuits is unknown. Two "grounds," each on arc and incandescent circuits were ascertained to be due to mechanical injury to the cables, and



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three "grounds" on arc and four on incandescent circuits were discovered to be due to bad joints.

Eleven "burn-outs" occurred on arc and three on incandescent circuits; three of the "burn-outs" on arc circuits were due to causes not ascertained. Three "burn-outs" on arc and three on incandescent circuits were ascertained to be due to mechanical injury of the cables and four "burn-outs" on arc circuits were ascertained to be due to bad joints.

Two "low tests" and nine "grounds," due to terminals can not be considered as faults in the cables proper. Of the 38 faults discovered in the cables, 18 were due to bad joints, 10 to mechanical injuries and ten to causes unknown; but probably mechanical injury.

The 38 faults of the cables occurred on 25 circuits, so that 106 circuits were operated throughout the entire year without a fault or trouble of any kind. Two of the 25 circuits were each responsible for five of the faults, one having four "burn-outs" and one "ground," the other four "grounds" and one "low test."

It may be said here that the troubles from bad joints occurred usually at the beginning of the use of the circuit, and the same may be said to a large extent of the troubles with the terminals. This can be avoided by careful work.

The nine "burn-outs," eight "grounds" and three "low tests," due to mechanical injuries or causes unascertained, may be considered as the dangers which can not be guarded against in a system where cables of several companies are in the same man-hole, to which employees of each have access, but the experience of nearly four years indicates that this source of trouble is decreasing. From May, 1887, to March, 1889, twelve explosions occurred in the subways; since the latter date none has occurred. No one has been injured from any cause.

Most, if not all, the incandescent circuits are operated every hour of the day, and some of the arc circuits also. Tests are usually made with all connections undisturbed.

Customers for incandescent lighting especially, have come to expect the light to be ready for them whenever they call upon it, and to be uninterrupted and of high standard. The above record of faults or troubles with the cables indicates that they may rely upon such service, and the occupation of the member of the staff of an electric lighting station known as "trouble hunter" has passed away.

Nearly all the current of the high tension arc and incandescent service transmitted in the City of New York below the Harlem River is conveyed by underground cables. Above the Harlem River the Board of Electrical Control allows the construction of aerial lines, no subways having been built in that section of the city. Below the Harlem River no overhead wires are permitted to be erected, and few of those that were in existence remain. It is probable that before the end of this year scarcely any will be in existence. The penalties endured by the companies for their opposition to the subways have been severe and drastic. The expense imposed upon them in their effort to take care of their business and meet the requirements of transferring their systems from overhead to underground has been enormous and burdensome. The expense continuing for rentals, due in a large measure to the amount of subways constructed and not occupied, continues, and seems likely to continue to be an enormous tax. These expenses and burdens have tended, and are likely to tend further in the near future, to confine the operations of the companies to territory contiguous to their generating stations, and may also tend to avoid the fierce competition which existed during the days of aerial transmission, and which lowered price to a point below remunerative rates.

If the subway situation in New York City was not such as it is, and it is such from the causes above suggested, there seems no reason to doubt, in the light of the experience possessed by all conversant with the situation, that fully as satisfactory accommodations and results could be accomplished at not exceeding 25 per cent of what it has cost and with corresponding beneficial conditions, which would prove, at least, not unremunerative to all interests affected.

From the experiences of electric lighting companies of New York city in their early days to that of their present practically uninterrupted service is a vast step in advancement in operation. The business of the generation and transmission of electric currents for all purposes to which it is applicable is no longer in the tentative condition of these early days. There is no longer any reason for beginning a company without full conception of what it may be expected to do. Competent engineers and electricians are many, who know the exact relations necessary between the several parts of a central station and its output. They are competent to plan the exact conditions needed between the boilers, engines, generators and conductors.

With the use of electricity for power for street cars and mechanical requirements conductors will be multiplied.

May it not be concluded, in view of the experiences in New York City, that all aerial conductors are necessarily transitory, particularly in our large cities?

Is it not advisable for controllers and managers of companies in such places to recognize that condition and endeavor to avoid the experiences of New York companies by planning deliberately the procurement of the right to themselves to build and operate their own subways and further to utilize the experiences of New York to avoid the expensive mistakes there made, and to place their business on a stable footing and in a position where they may have immunity from injurious and cheap competition and secure service to their customers free from the interruption belonging to aerial transmission? It is rumored that one company in a large city, where no laws compel them to do their business underground, feel themselves forced to seek that method of doing their business, by reason of the fact that their aerial lines are being overloaded. Is this not likely to be the case in many other places? The telephone companies find it materially to their advantage to use underground conductors, and are doing it in many cities.

Underground conduits and conductors for electric lighting and power, provided with due care and deliberation, need not increase the fixed charges of companies doing a reasonable extent of business to such an extent as to be prohibitory.

The transmission of electric current is entirely analogous to that of gas, water or steam, and must inevitably, in the not very distant future, be conducted underground, as they are. To electric light companies, as to gas, water and steam companies, the legislatures and law-making bodies should give rights enabling them to meet the condition in the manner calculated to produce the best results for the companies and the public users, and if the above recital of causes and effects, experiences and results in New York City will tend to prepare the way to avoid to other companies the experiences of those in New York city, the relator will feel justified with his effort, as he is appreciative of the compliment implied by the invitation of our worthy President, which has afforded the opportunity to offer it for your consideration.

#### Some Experiences With the Alternating System, by R. H. Sterling.

In choosing the above title for my paper, I feel that I have taken one that we are all more or less interested in, and especially those who are directly identified in this inductive method of furnishing light, and whose work in the practical details of this system has been accompanied with interesting experiences, which are always beneficial to all of us in perfecting our profession.

To those who adopted the alternating system in the early days I need not recall the feelings with which we looked on this long-distance transmission of energy for incandescent lighting. It was such a gigantic stride—such a radical departure from previous methods of incandescent lighting—that many who had experimented for the benefit of parent companies before were a little cautious about nursing this new infant up to the state of practical manhood. Especially were we so when so much was said and written by the opposition side and by others who claimed to be non-partisan. However, our company, among the first, did install a large alternating plant—the largest, I believe, at the time in the United States. How wise we were in doing so I will answer by pointing to the enormous growth and success from the start of alternating current lighting, and its finally being fostered by those who were at first its bitterest enemies.

We did experiment some, I will admit. A few minor details in apparatus did not just meet the requirements for practical use; but our parent company has always been willing to adopt the suggestions of its users and remedy defects discovered by them—a plan, by the way, which should be followed by all who manufacture apparatus—for the central station men are those who are best able to judge its merits and criticize it from all sides.

I will now take the principal features of an alternating station in detail, describing what have been our results and the best practice in my experience.

I will begin with the switchboard—a subject often discussed in these meetings, but none the less important—and I will try as much as possible not to go over the same beaten track, with possibly some new details. A circuit board is eminently better made of marble, as a matter of both safety, durability and appearance, and should have plenty of space between it and the wall. The dynamo bus wires should run in horizontal rows on the back, with plug holes extending through to the front, to connect to either side of each changing switch.

There is a changing switch, of course, for each feeder or circuit, and all bus wires can be connected to any particular feeder. The front of the board should be divided into perpendicular panels, each panel representing a feeder.

On the back there will be the converter for voltmeter, compensating devices, etc., and the fuse blocks. These are preferably placed on the back, as it is an unpleasant thing to have a fuse blow in a man's face, and they should not be so high on the board that they cannot be reached standing on the floor. Many of you, undoubtedly, have had trouble with a fuse arcing, and finally melting the fuse block into a conglomerate mass, or setting fire to the switchboard. There are two simple remedies for overcoming this; one is to have all fuses covered with a piece of asbestos paper rolled around the fuse wire or link in the form of a tube, a little larger on the inside diameter than the wire, to allow for radiation of heat, so that the fuse will not melt under its rated capacity. These asbestos tubes are very easily made, and can be pasted either with shellac or silicate of soda, which is preferable, the idea being that when a fuse is blown, the pent-up gases in the tube are forced out at either end so violently that the resulting arc is dissipated immediately. I believe I am not the originator of this idea, but believe we can claim the use of asbestos as our own, and which is the only substance that is practicable.

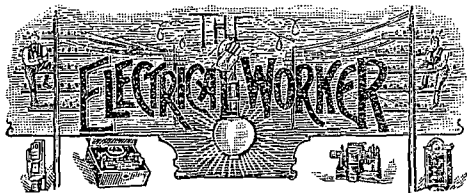
Another simple plan to prevent arcing is to have all fuse blocks placed on a narrow shelf, with their faces up, as there is always a tendency in an arc to take an upward direction, owing to the current of heated air resulting from it, and in taking this direction there is a natural pulling away of the arc from the two metallic portions of the fuse block; whereas, were it in a perpendicular position with the current usually coming in at the bottom of the block, this upward tendency of the arc only completes the path across the gap, and so continues arcing. Fuse wire as now made is quite reliable as to its carrying capacity, but, like many other good things, is not trustworthy, if abused. A lead fuse, either wire or flat link, should never be screwed down under a screw head and washer, no matter how small the carrying capacity it is intended for. This may do for a short time, but the soft metal soon loosens up, a poor contact is formed, and the fuse melts from the heat thus generated, causing no end of annoyance. This applies to fuses, no matter where they are used, all over the circuit. The one way out of this is a small flat copper terminal, slotted to slide under the screw head, and soldered to each end of the metal. These are cheaply made. A boy with a punch and die can stamp out many hundreds of them in a day, and the soldering, with a little experience, is rapidly accomplished. Had we adopted these fuses when we first began to furnish light, five years ago, and insisted on all inside wiring being fused in this manner, we should have been many dollars ahead to-day, and there would have been fewer lights out during that time.

Nine-tenths of the calls on our complaint book show a record of fuses blown in branch or main blocks of inside wiring, which we have to send men out to replace, and from repeated inquiries from these men I find that this same portion of nine-tenths would hold good for fuses that had blown or rather melted from poor contact, due to lead becoming loose under screw heads, and from no cause of short-circuits, overloading or trouble in the wiring. We now compel all wiring contractors to use a copper terminal fuse, and we ourselves replace all blown-out ones with this style; but with seventy-five thousand lights connected up, we do not see our way clear to weeding out the old fuses just at present; so let this be a warning to those young in the business.

On the front of the switchboard we have for each section or panel a volt and ampere meter for every feeder, one over the other, and surmounting these a pilot lamp run from the converter supplying the voltmeter, whose primary should be tapped on the feeder wires above the fuse block, so that should a fuse go out quietly, as is generally the case when fuses are arranged in the manner I have mentioned, the attendant's attention will be called to the fact by the extinguishing of the pilot lamp. The changing switch, generally placed on the front of the board for each feeder, should be about breast high, so as to be easily reached to make a quick throw. I say usually placed on the front of the board, as it is only recently that a new switch has come out that has its jaws and contacts so arranged that it can be placed on the rear of the panel, with the lever extending through a slot to the front of the board. This is a matter of great safety to the switch tender, for, as stations increase in size and load, a new element of danger sometimes manifests itself in the act of throwing these changing switches. A violent arc is formed which follows across from one set of contacts to the other, throwing two dynamos in multiple through the medium

(Continued on page 15).

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St. Louis, Mo., March, 1893.

Advertising Rates on Application.

#### Trade Unions.

The following report from the Hon. L. G. Powers, Commissioner of Labor of Minnesota, is very appropriate just now and is especially recommended to the perusal of Judges Taft and Ricks.

"The best employers in our midst, the men who have the fewest industrial disputes and quarrels, those who raise against themselves the least antagonism among the toilers, uniformly give their men the same right of association which they claim themselves. The State can not err in making the standard of practice established by these men the supreme law for all. This is the meaning and scope of the law which has hitherto been asked for by organized labor. It is a statute making it a penal offense for an employer to require his workmen to renounce all connection with labor organizations as the condition of their employment. Only by such a law can the rich man's rights of associating for making money, or securing added profit on his capital, be matched by the laboring man's right to associate for advancing his wages and for improving his mental and moral condition. Only thus can the practices of the best employers in our midst be made obligatory upon all.

Such a statute, recognizing the workman's right of free association, is the first practical step toward bringing all labor disputes, as strikes, lockouts, and boycotts under the domain of law. It would open the way, also, for ultimately bringing the union, with all its principles and practices, within the control of law in a way similar to those operative in the case of moneyed institutions. And all

disputes between men were settled by the arbitrament of private war. Step by step the old state of society has been done away with and the right of private war wrested from the private individual. With one exception all disputes and quarrels between individuals or associations must be settled by the courts of the land. That one exception is to be found in disputes between the employer and his employes—disputes in which the labor unions play such an important part. These disputes, leading to strikes and lock-outs, are very disastrous to all concerned and to society as a whole. If at last they are to be settled in a peaceful and orderly way by courts of arbitration or other tribunals of the state, instead of as now by private industrial war, the union must be recognized, as now the law takes cognizance of the corporations of capital. As to the first practical step towards that recognition, and thus towards the realization of an arbitration of all labor troubles, the law above referred to may be urged upon the attention of all.

A law making it a misdemeanor for an employer to forbid his employes joining a labor union embodies the practices and usages of the best employers in our midst. Enforced, it will aid in lessening the present causes for friction in the industrial world. The methods and practices of business men suggesting such a law also points the way for framing a statute for compelling arbitration of all labor disputes. Many of the unions have made arbitration the law of their members. No strike can be ordered by them unless all possible efforts for arbitrating their disputes have been tried and proved unavailing. In the same way many employers are ever ready to settle all troublesome questions with their workmen by this honorable and just method. Out of the practice of these employers and unions will soon develop a way of compelling the over-reaching and unjust men of all walks of life to abstain from private individual war and settle their disputes before the courts of the state."

The St. Louis Electric Club is still on the boom, and is now talking of a library, a piano, a billiard table, and several other luxuries that are indispensable for every well-appointed club.

The Bryant Electric Co. had about the neatest and most useful souvenir at the convention, and Mr. Thomas C. Grier, the western manager of the company, was no niggard in distributing them.

The suit of the General Electric Co. against the Columbia Incandescent Lamp Co. has by consent of counsel been postponed till April 4, and will be before Judge Halbert of Denver.

Wm. H. Bryan, of the St. Louis Electric Club, has been appointed on the municipal committee to examine into the smoke nuisance.

#### You

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The difficulty between the Electrical Workers on the World's Fair buildings and the World's Fair management and the New York Insulated Wire Co. was peaceably adjusted last week. The Brotherhood pursued the same course in this case that it has in all previous cases. Firmly believing in the principles of arbitration, and relying on the justness of its grievance, it is ever willing to submit its case to any disinterested body of men for arbitration.

#### Official.

The amendments to the constitution which were proposed at the last convention and submitted to all the Unions for approval or rejection have been adopted by an almost unanimous vote.

By a recent decision of the E. B. all new members initiated since the regular January assessment for the journal has been paid are required to pay an assessment of 25 cents at the time of initiation, or as soon afterwards as possible for the support of the official journal. Read this in connection with Article V, Section 11 of the constitution, and you will see the object of it.

To the courtesy of the *Western Electrician* we are indebted for the very handsome cuts in this issue of President James I. Ayers and Judge Armstrong—last year's and this year's presidents of the Electric Light Association.

#### A Day With the Boys in Chicago.

Last week we took a short vacation in the form of a trip to Chicago. While there we had the pleasure of seeing the difficulty at the World's Fair amicably settled. Grand President Henry Miller and the Executive Committee of No. 9, who had charge of the affair, by good judgment, coupled with the spirit of fairness manifested by the directors of the World's Fair and the manager of the New York Insulated Wire Company, settled the difficulty to the satisfaction of all. It is needless to say that the boys in Chicago feel happy and will do their share toward having the World's Fair buildings ready on opening day, May 1.

No. 9 has opened an office and headquarters in the Post Building, 166 East Washington street, and is doing a regular real-estate business. The office is in charge of the Financial Secretary, Bro. J. H. Capps, who has his hands full looking after the interests of the members. Bro. Edison, the genial President of No. 9, is always on the run. His position as Superintendent of the Cornish Electric Construction Company and President of an organization of over 700 kickers makes life very interesting for him. Bro. C. A. Roff, the business agent for No. 9, is a hustler, and the way he brings in new members would show that No. 9 has the right man in the right place.

No. 41, which was the baby Union at our late convention, has grown to be a large-sized boy. Brother C. J. Edstrands, one of our grand officers, is president of this Union. I had the pleasure of attending one of their meetings, accompanied by Brother Miller. Brother Edstrands handles the gavel like a veteran, and, although the hall was crowded, perfect order prevailed. No 41 has a large number of bright young men, who seem determined to make their Union a success. We noticed a few familiar faces in the hall—boys from St. Louis, who have taken up their residence in Chicago, among them Brother Williams, one of the charter members of the old Wiremen's and Linemen's Union of St. Louis. Grand President Miller delivered a rattling good speech, which made a great impression on the boys. Brother Miller has greatly improved in his delivery since he left St. Louis a year and a half ago. He still has the same earnest and fiery manner, but has lost most of his German accent.



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### Personal.

A. F. Carville, of No. 1, electrician for the Montgomery City Electric Light Co., lit up the gloom of our sanctum with his beaming countenance one day last week.

Information wanted of T. DeLacey. When last heard from he was working for the Van Depole system in New Orleans. Address R. B. JOYCE, 303 S. Basin St., New Orleans.

"Little" John Dunn, of Cleveland, is all right despite the fact that our artist tried to mutilate his handsome face. We hope that we have sufficiently atoned for the offense by killing the artist.

L. W. Dillman, the financial end of No. 34, after years of faithful service with the telephone company in Brooklyn, has resigned his position to accept a more lucrative position in Staten Island. He still keeps tab on the due cards of No. 34.

Grand President Miller and Grand Secretary-Treasurer Kelly visited the Chicago Unions last week and had a hearty handshake with the brethren of the Windy City. Grand President Miller will be in Pittsburg for probably the next three weeks.

Ed. Williams, formerly of Local Union No. 1, now of No. 9, Chicago, visited St. Louis expressly to hear the Tesla lecture, and was so interested in it that for once he forgot his usual role of masher. Williams is young, good-looking and a great student, and will make his mark in the electrical business.

### Echoes of the Convention.

Matlock, of the Laclede Power Company, showed up conspicuously at the Tesla lecture in all his blonde beauty. His well-fitting swallow-tail, his wealth of immaculate shirt front, white choker and gold eye-glasses gave him the appearance of a German divinity student. These blondes are perennially young and seem to have discovered the fountain of everlasting youth.

President Ayer showed his knowledge of human nature in appointing Al. Einstein on the Ladies' Reception Committee. Einstein could give pointers to Beau Brummel in matters of dress, but always keeps one eye open for business. He shows his contempt for prevailing superstitions by occasionally wearing a magnificent opal pin instead of the 5-carat diamond of which he is the owner.

"A Rose by any other name would smell as sweet," but this particular P. L. Rose is a full-blown Jacquimenot and as dazzling as the carbon that glows on his broad and manly bosom. Envious competitors claim that he carries a small storage battery about with him and that the unrivalled brilliancy of his diamond is enhanced by being connected therewith.

Wagner, of the Wagner Manufacturing Company and the Missouri Light and Power Company, was one of the handsomest members of the Convention, and his well-knit figure showed to advantage in the finest of raiment. It is currently reported that his clothes are all made in London, you know. He is an able speaker and very few that heard him were aware that he is now working on a patent that will surprise the electrical world.

President Ayers' well-known executive ability was put to the severest tests during the busy days of the Convention, and as usual he rose to the occasion. He seemed omnipresent and had a pleasant smile and kindly greeting for each and every one. To his personal services was largely due the success and smoothness that characterized the carrying out of the Convention programme.

### Exchanges.

The following exchanges have been received and thanks are herewith returned for the same:

Western Electrician, World's Fair Electrical Engineering, Popular Electric Monthly, The Labor Signal, Midland Mechanic, St. Louis Critic, Painters' Journal, Brass Worker, Denver Trade Review, Eight Hour Herald, Foreman's Advance Advocate, Industrial Magazine, Journal of Labor, Electrical Review, Electrical Engineer, Labor Herald.

### Convention of the National Electric Light Association.

The sixteenth meeting of the National Electric Light Association was held in this city February 28 and March 1 and 2. Through the courtesy of the officers of the Association we are able to give our readers the benefit of the best papers read at the meeting.

Nikola Tesla, the youthful rival of the great Edison in the wonder of his electrical achievements, delivered his famous lecture before an audience that packed Music Hall to its utmost capacity.

### Electric Display at the Inaugural Ball.

One feature of the ball was the electric display. There was a mammoth illuminated fan at the east end of the building. The designs outlined in tiny electric lamps of different colors. The whole divided into sections and controlled by an elaborate switch, which supplied the current to the sections one by one until the entire design was aglow, thus creating the illusion of the fan opening. Then the sections were extinguished in the same manner, apparently folding the fan.

There are eight large columns which support the roof of the Pension Building and near the base of each of these were placed electric wheels of artistic designs outlined in miniature lamps which changed form and color as the wheels revolve. Hundreds of lamps shone in banks of exquisite cut flowers which adorned the base of each column. There were triumphant arches, American eagles, stars and stripes, graceful wreaths, vases and friezes of various colored electric lights all over the building without number. In the panels formed by the ballustrades of the second balcony the names of the Presidents of the United States were flashed in electricity, while over the two triumphal arches in larger letters the names of Cleveland and Stevenson. To produce these effects about 15,000 lamps were required.

The Atlantic Hotel, corner Van Buren and Sherman streets, Chicago, is quite a headquarters for visiting members of the N. B. E. W. The handsome manner in which the Cummings Brothers, proprietors of the cozy hostelry entertained the delegates to our Convention last fall, made them many friends, and their liberal treatment of guests is in strong contrast to the exorbitant demands made by most hotels and boarding houses of the Windy City. If visiting the World's Fair be sure and call and you will meet many of the brethren.

When you visit Chicago do not forget to call on the old-time friend of electrical workers, John E. Fitzpatrick, 204 Washington street, Chicago.

### Obituary.

News was received in this city last week of the death of Bro. E. Swan, a member of No. 9, at Waco, Tex., caused by the breaking of a telegraph pole. Although our late brother was known to some of our members for the last fifteen years, no one seemed to know where his home was or the whereabouts of any of his relatives.

### RECORD OF PATENTS.

The following recent electrical patents are reported by Higdon & Higdon & Longan, patent lawyers, 215, 216, and 217 Odd Fellows' Building, St. Louis, and 48 Pacific Building, Washington, D. C.

493,447, G. A. Rollins, armature connection for dynamo-electric machines, Chicago, Ill.

493,337 H. F. Parshall, Lynn, assignor to Thomson-Houston Electric Co., armature for dynamo-electric machines, Boston, Mass.

493,375, G. S. Dunn, assignor to Crocker-Wheeler Electrical Co., New York, N. Y., balancing armature for dynamo-electric machines, or electrical motors and balancing same.

493,349, N. C. Bassett, assignor to Thomson-Houston Electric Co., of Conn., armature for motors and generators, Lynn, Mass.

493,439, A. W. Meston, assignor to Emerson Electric Manufacturing Co., of Missouri, commutator for dynamo-electric machines and constructing same, St. Louis, Mo.

493,380, E. F. Hammarstrom, assignor of one-fifth to A. Jungmarker, combined cut-out and lightning-arrester, Worcester, Mass.

493,328, L. P. Bonebrake, multiple terminal cut-out, Maryville, Mo.

493,431, J. Keller, electric motor for dental work, Canton, O.

493,601, T. W. Shepherd, thermostat, Peabody, Mass.

493,411, J. T. Robb, assignor to Edison General Electric Co., base for electric light brackets, New York, N. Y.

493,313, E. Thomson, assignor to Thomson-Houston Electric Co., of Conn., dynamo-electric machine, Swampscott, Mass.

493,361, M. Immisch, assignor to Immisch Electric Navigation and Power Co., of New Jersey, switch for electric motors, London, England.

493,358, R. M. Hunter, assignor to Thomson-Houston Electric Co., of Conn., Electric Search Co., Philadelphia, Pa.

493,243, W. F. Bossert, assignor to Utica Electrical Manufacturing and Supply Co., Utica, N. Y.

493,485, A. M. Coyle, assignor to Standard Screw Elevator Manufacturing Co., electric switch, Baltimore, Md.

493,369, A. Stromberg, electric switch, Chicago, Illinois.

493,422, J. V. Capek, assignor of one-half to E. H. Johnson, electrically heated vessel, New York, N. Y.

493,359, R. M. Hunter, assignor to Thomson-Houston Electric Co., of Conn., electric arc lamp, Philadelphia, Pa.

493,360, R. M. Hunter, assignor to Thomson-Houston Electric Co., of Conn., electric arc lamp, Philadelphia, Pa.

493,609, H. P. Ball and A. Metzger, assignors to General Electric Co., lamp socket, New York, N. Y.

493,466, J. R. Protzman, support for electric lamps, Streator, Ill.

493,578, A. G. DeWitt, electric lamp supporter, Detroit, Mich.

493,341, E. Thomson, assignor to General Electric Co., of New York, lightning arrester, Swampscott, Mass.

493,277, O. Lugo, assignor to Cosmic Alloy and Metal Depositing Co., of New Jersey, electro-depositing metals, New York, N. Y.

493,623, T. Harris, assignor by mesne assignments to Harris Electrical propulsion Co., electric railway system, limited, Detroit, Mich.

493,620, S. P. Frier, assignor to Western Union Telegraph Co., of New York, telegraph relay, East Orange, N. J.

493,253, W. E. Decrow, signaling-telegraph, Boston, Mass.

493,297, T. B. Rogers, acoustic telephone, Brooklyn, N. Y.

493,245, G. M. Brown, assignor of one-half to E. J. Cahill, La Salle, Ill., ear attachment for telephones, Nashville, Tenn.

493,403, S. L. Shaffer, telephone index, Worcester, Mass.

493,558, L. S. Norton and F. E. Hoffman, said Hoffman assignor to said Norton, telethermometer, Alpena, Mich.

493,602, T. W. Shepherd, electric controlling device, Peabody, Mass.

### YOU

Can obtain a pack of best quality Burlington Route playing cards by sending 15 cents in postage to

D. O. IVES,  
Gen'l Pass. and Tkt. Agt.,  
St. Louis, Mo.

## CORRESPONDENCE.

[The Press Secretary, though an officer of the Local Union, is really a resident correspondent of the *ELECTRIC WORKER*, and should keep his paper thoroughly posted on all matters pertaining to the electrical industry in the vicinity he represents. New plants, extensions of old ones, new electric roads, state of trade, new ideas, electrical novelties and accidents are a few of the topics to report on. Please notice that the minutes of the meetings are not required, except the report of new officers, and such matter as may be of general interest to all members.]

MARCH 11th, 1893.

To the Local Unions of the N. B. E. W.

DEAR FRIENDS AND BROTHERS—We beg to advise you that we have this day settled our grievance with the New York Insulated Wire Co. covering their contract on the construction work for the World's Columbian Exposition. Copy of this contract will be forwarded to you in a few days. You will therefore advise all your members that our grievance has been amicably settled and the disposition shown towards us by the New York Insulated Wire Co. in aiding us to adjust our differences with the Directors of the Columbian Exposition induces me to request that all objections you may have to the goods manufactured by the New York Insulated Wire Co. shall be removed at once and on the contrary they should be recommended by you.

Fraternally yours,  
HENRY MILLER,  
Grand Pres. Nat'l. B. E. W.

## LOCAL UNION NO. 1.

ST. LOUIS, March 13, 1893.

EDITOR *ELECTRICAL WORKER*—AS I have not seen No. 1 represented in the *WORKER*, and as I know all the boys are glad to hear from us, I thought I would write her up. Our Press Secretary is asleep, but we are still at the old stand. We initiated sixteen new members last night; that makes forty-eight since January 1, 1893, which I think is going pretty good. We had one of our old-time smoking parties in honor of our new members, which was enjoyed by all. We had the Bunch of Keys Quintett in several of their selections; Jno. Simins in the "Home Brewery" solo; J. T. Kelly in a rattling good talk to the boys; Hisserich and Wilson sang "The Man in the Moon"; Geo. Hutchison gave us "A Plantation Talk," and Mickey Walsh gave us "Niedringhaus in Congress" and "Paddy in a Fourth Ward Speech."

We are to initiate all the foremen from the Electric Light Companies next week.

In the next issue I will tell you of the Modoc.

M. A. WALSH.

## LOCAL UNION NO. 2.

MILWAUKEE, WIS., March 10th, 1893.

EDITOR *ELECTRICAL WORKER*:

DEAR SIR—Since my last letter to you, No. 2 has made considerable head-way in the shape of getting new members. At our meeting on the 1st of March, a cyclone struck terror into the hearts of the faithful, and drove them down to our hall, to the number of eight new members; all good men and practical electricians, the kind of members No. 2 likes to see and receive into our glorious brotherhood.

No. 2 is in good working order at present, only two leaks in the circuit, but with the aid of our doctor and a little rest, I think the leaks will be patched up in a day or two.

Now, Mr. Editor, a word for our beautiful city of "Beer and Bricks," and her people. They are beginning to know the value of our electrical currents. Ten years ago there were numbers who would not have a telephone in their houses, because they entertained the idea it would kill them or set fire to their places; but to-day it is entirely different. Now they can not get enough of our electrical currents. While, with our electric street rail-

way, city arc lights and incandescents, we are rapidly advancing to the front. With the aid of good, practical, experienced men to perform the work of construction, the public are enabled to patronize the electric currents with safety. But, where shall we find such men? Advertise in the Official Journal of the National Brotherhood of Electrical Workers; that is the means of finding good men.

Fraternally,  
F. W. SMITH,  
R. S.

## LOCAL UNION No. 4.

NEW ORLEANS, La.

Editor:

DEAR SIR—The electric cars have been in operation since the 1st of February on the New Orleans and Carrollton Railroad. They are knocking spots out of the other roads in that section of the city. The New Orleans Traction Co. are receiving cars daily, and will start them shortly. They expect to begin work, in a few days, on Bryannia Street. The road will be the West End and Lake line. Outside of that there is nothing of very much importance in this city.

Yours fraternally,

J. J. VIVES.

## LOCAL UNION, No. 5.

NASHVILLE, March 10, 1893.

DEAR SIR—Union No. 5 is very well, thank you, and hopes to rank alongside the big ones before long. Our last meeting was held Wednesday, Feb. 22nd, with a fair attendance. President Prang called the meeting to order and the regular routine of business was transacted.

Union No. 5 is composed mostly of employees of the Cumberland Lighting & Power Co. of this city. This Company will, in a few days, occupy their handsome new building, corner Whiteside and Front Streets, which is fully equipped with all the modern improvements, and will, when finished, be one of the finest plants in the South. The T.-H. System will be used exclusively.

Whether the above company will furnish the city lights has not yet been determined, as another company is in the field, and there will be some lively bidding before it is decided. The other company, the City Lighting & Power Company, is supposed to be backed by the Western Electric Company, and is out for the "stuff." There is some talk of the city's building and operating its own plant.

Trade is good, with splendid prospects for the future. We have no idle list and so far had no accidents and have had no sick or death benefits to pay. Our President—August Prank—is a genial, big-hearted German, and is for the Union first, last and always, with heart, soul and pocket-book. Recording Secretary, J. C. Bender, is thoroughly competent and is a very graceful kicker also. Financial Secretary and Treasurer, E. W. Morrison, alias "Blossom," is always on hand with his little black pipe, and adds much to the meetings by his brilliancy of argument and the ruddy glow of his nose. Bro. Briggs has lately added a beautiful golden-hued mustache to his face which enhances his appearance very much. Bro. Wilcox is seldom seen without a supply of bananas, and to deprive him of this luxury would greatly impair his health, otherwise he is perfectly sane. Last but not least by any means, is the "only" Smith. All I can say of him is, he is a good boy, for he has threatened to "do me" if I write him up.

Fraternally,  
P. H. LANGDON,  
Press Sec.

## LOCAL UNION NO. 8.

TOLEDO, OHIO, March 9, 1893.

Work is quite dull in Toledo at present, owing to litigations between the electric companies, as they have injunctions and cross-injunctions served on one and each other in regards to the right-of-way for construction work for light and railroad

purposes. They are willing to pay large sums of money to lawyers, councilmen, etc., to gain their point over one another instead of amicably settling their differences. A few weeks ago they were ready to shut down their plants for six months before they would concede a raise of a few cents a day to their faithful and experienced employees and even went so far as to employ green farm hands, who destroyed their machinery, and as every electrical worker can better imagine than I can describe the kind of an electrician a farmer will make, he can guess the results. One of the managers already acknowledged a loss of \$5,000 through his farmer electricians.

I expect many of the electrical workers will be pleased to learn of the success of Brother Francis Head with his inventions. He was granted two patents—one a trolley hanger—which does away with soldering, and one on the cable hanger. He is at present working on one which, when completed, shall surprise many electrical inventors.

O. C. McMAHON,  
Press Secretary.

## LOCAL UNION NO. 9.

CHICAGO, March 11, 1893.

J. T. Kelly, Esq.:

DEAR SIR AND BRO.—The following is a copy of the contract signed this day between the New York Insulated Wire Co. and Local Unions Nos. 9 and 41, N. B. E. W.:

## CONTRACT.

Agreement entered this day between the New York Insulated Wire Co. and the National Brotherhood Electrical Workers of America, Local Unions Nos. 9 and 41.

1st. That all wiremen holding a union card shall receive 37½c per hour; 8 hours time to constitute a day's work, time and one-half for over-time and double time for Sundays.

2d. That helpers shall receive 25c per hour.

3d. That New York I. W. Co. shall not under any circumstances employ more helpers than wiremen. Laborers employed in digging holes, ditches or excavating or doing any work not directly connected with wiring shall not be considered as helpers.

4th. That the N. Y. Insulated Wire Co. shall at all times give union men the preference, this to cover all men to be employed from date.

5th. That all wiremen who were discharged or left the employ of the N. Y. Insulated Wire Co. on account of late dissatisfaction shall have first preference.

6th. It is also agreed that the men now employed by N. Y. Insulated Wire Co. shall not be worked over-time unless the men who were discharged or left the employ on account of strike shall be re-employed; excepting the World's Fair Columbian Exposition Company issue a special order to meet some urgent emergency. This applies to all orders where work must be commenced within twenty-four hours.

7th. It is also agreed that the N. Y. Insulated Wire Co. shall have the privilege of discharging, without question, any union man that is not a competent and practical workman.

8th. In the event of the Local Union No. 9 not being able to furnish wiremen and helpers promptly, the N. Y. Insulated Wire Co. shall have the privilege of employing non-union men.

In consideration of your acceptance of this contract, we, the members of the above-named unions, pledge ourselves individually and our associations, to be faithful to our duty, not to agitate trouble in any manner or form at any time during the continuance of the World's Fair, and also agree to notify at once by special notification to all members of our brotherhood and all other trade unions that we have adjusted satisfactorily our grievances with the N. Y. Insulated Wire Co., and that all objections and utterances against the goods manufact-



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THE ELECTRICAL WORKER.

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ured by said company will be removed and stopped at once.

This agreement taking effect this 11th day of March, 1893.

N. Y. I. W. Co.,  
J. W. GODFREY,  
Gen. Manager.

HENRY MILLER, G. P.  
G. W. EDISON, Local Pres.  
J. H. CARP, Fin. Secy.

To the Editor of the ELECTRICAL WORKER:

Having just read a letter from a friend of the workman in regard to curtailing bar bills, I deem it my duty to say a few words to the electrical workers through their journal. The writer of the letter above referred to says that a man who is exposed to all kinds of weather needs some stimulant. To this I agree, but not in the form of drinks. Let him save his money and provide himself with good warm clothing and plenty of wholesome food, and not live on beer and free lunch, and he will have all the stimulents he needs. No man can perform the duty that is assigned to him and do justice to himself and the company he works for if he drinks even moderately. We should well consider that every drink we take is a nail in our coffin, and a direct blow at the Brotherhood, as it hinders us from achieving the objects we are organized for.

T. J. FINNELL.

Chicago, March 1, 1893.

LOCAL UNION No. 10.

INDIANAPOLIS, IND., Feb. 20th, 1893.

Mr. Editor:

DEAR SIR—No. 10 held a meeting this evening, Pres. S. B. French in the chair. Minutes read and approved. The attendance was unusually large and all the officers were present. Several spoke for the good of the Union and some very instructive themes were discussed. The officers' reports show that the Union is substantial as far as a financial basis is concerned.

Communication from G. P. Miller, then in the East, stating the New Haven difficulty; \$25.00 voted them.

The labor organizations of this city held a mass-meeting at the Masonic Hall one evening this week. Our sick brothers are convalescing rapidly.

Some brothers, or rather they at one time belonged to the brotherhood, are traveling somewhat on their faces and an old card. There should be a stop put to such maneuvers, and the sooner the better for all concerned. Every secretary possesses a paper which can be procured (as per Book of Rules), that entitles a brother to all the hospitalities of his own local union, and when traveling he should carry the same with him.

The meeting adjourned until March 6th.

Yours fraternally,

D. A. GREENWOOD,  
Press Sec.

LOCAL UNION No. 12.

EVANSVILLE, IND., March 7th, 1893.

Editor E. W.:

DEAR SIR—No. 12 held a meeting this evening, President E. Wright in the chair. All officers present with a good attendance of members. The Committee on Entertainment report everything moving very nicely; the tickets were given out and all the boys are fighting for the spurs. There was a committee appointed called the "kickers," and their business is to raise up the backsliders, and if it is necessary to give any one a licking—the boys are sworn to stay with them. They have done some very faithful work. The members on the Kicking Committee are S. Riggs, Harry Fisher, L. E. Wilke, Joe Erwin and W. H. Ernst.

The members of No. 12 have a debate every meeting night on some electrical subject. The president announces the first subject, then the recording secretary calls the names off the Roll-book.

In this manner every member is allowed to choose a subject for next meeting.

The street railway has stopped work on account of bad weather. Brother S. Riggs left us and has gone to work for the E. & T. H. R. R., to help build a line from Evansville to Terre Haute and back. The job will take several months. Brother E. L. Masters has finished off the Eichel Building. He has also received the Arcade Building which will be about one month's wiring.

Brother Johnson, of No. 11, was here on a visit; he has put in an electric light plant at Oakland City and started it going.

I am ordered by our Union to publish an expelled brother. His name is Henry Glaubauch; he is a lineman for the District Telegraph Company. He took sick, fell in arrears and the boys helped him out by paying his dues. He claims to have about \$20.00 of the Union's money, but we have no receipt to show against. We have sent several committees to him, but it does no good. The boys have treated him very kindly and received no thanks for their interest in him. He certainly is a man without any principle, and our advice to the brotherhood is to lookout for him. He promised to pay the money he owes the Union, also what he owes the boys, but now he shows no indication of doing so. Hoping all the boys will beware of him I remain

Yours fraternally,

W. H. ERNST,  
Press Sec.

LOCAL UNION No. 16.

CLEVELAND, OHIO, March 2d, 1893.

Editor E. W.:

DEAR SIR—Local No. 16 is getting along nicely, and although we are doing things quietly, we are doing effective work. Owing to the very severe weather this winter, which has kept our members employed almost night and day, we have not been able to have our meetings largely attended; but as the weather is moderating, we already show an increased attendance, and hope before long, to be able to present a full house, at every meeting. Wishing to bring every important measure before all our members, and not being able to secure their attendance, we did not wish to pass upon them; consequently our progress has been much delayed; but as we have just drawn up our new by-laws, we are going to adhere strictly to business in the future. Trade in Cleveland is fair, with every prospect for a boom in the spring, as several large jobs are under contemplation.

Several street railways, are talked of, with the assurance that one or two will be completed, and nearly all our shops look for an increase of business, in fact the Bush Electric Co. have already begun to increase their force, and from all indications, Cleveland will be a good town for an electrical worker to strike. Nothing, but words of praise are heard for the Electrical Worker here, and No. 16 will do all in its power to make a grand success of our paper.

Fraternally,  
NICHOLAS DUFF,  
Press Sec.

DETROIT, MICH.

President Shuart has left the employ of the Telephone Co. to take a more remunerative position with the Police Department.

Bro. D. H. Doak has gone to Bay City, to take charge of the line work for the street railway company, who are equipping their line with electricity.

Business in the electrical line is fair, with prospects for a great improvement during the coming summer.

The bill which Representative Moore introduced in the Legislature, early during the present session, authorizing this city to own and operate its own electric lighting plant, has met with considerable opposition from the "Combine," but, after con-

siderable argument pro. and con., in committee, it came up for final disposition on the 7th inst., and passed with but two dissenting votes. The Senate pass upon it, in a week, and there appears to be no reason for apprehending adverse action from them. After attempting to defeat the bill in committee, without success, the representatives of the "Combine" attempted to insert a provision to the effect that the city would be forced to purchase one of the plants at present in operation, but it was "no go." As passed by the Legislature the bill limits the expenditure for this purpose to \$600,000 within three years, unless voted upon by the people. Mayor Pingree is the champion of the measure and has the moral sympathy of the people.

REX.

LOCAL UNION, 21.

WHEELING, W. VA., March 8th, 1893.

Editor ELECTRICAL WORKER:

Noticing you have forgotten us in your last two issues, I will try again.

No. 21 is getting along nicely, "slow but sure;" we are not improving as fast as some of our larger unions, but are constantly adding new lights to our circuit.

I noticed in your last issue, comments on the shortness of office terms.

I agree with the Brother six months is entirely too short. It takes nearly half of the term for the new officer to get properly acquainted with the duties he has to perform. I would heartily endorse a larger term.

The Street Car strike which has been going on here for the last six weeks, has not changed in the least. The cars are manned by scabs, but the conductors are having a very lonesome time of it, as they do not collect enough nickles to pay for the oil used. Our meeting night has been changed from the second and fourth Tuesday to the first and third Tuesday of the month.

We all heartily congratulate our editor on the very creditable appearance of the ELECTRICAL WORKER and unite in wishing our journal a phenomenal success. Hoping to hear from all the corners, I remain,

Fraternally,  
C. S. ULLERY,  
Press Sec.

FROM AN OFFICER.

Editor E. W.:

Allow me to congratulate you on your more than successful efforts in behalf of our organization, in producing a paper which I am sure is and will be highly appreciated by all those who may read it. It is a paper of which any labor organization may be proud. We now have something which we can bring before the public; which is capable of showing them that our aim is to encourage and elevate our brethren to a degree where they will be respected by all men and recognized as mechanics, and as men who have battled with the world and overcame all obstacles, in order that they may gain a thorough knowledge of their trade, not alone as theorists but also as practical workmen.

Brethren, through the ELECTRICAL WORKER, we should do all in our power to aid one another. We should not be selfish, and if one brother knows more than another he should not grudge his fellow-comrade the benefit he may reap by perusing articles which may appear in the ELECTRICAL WORKER. It will also enable you to bring in play your latent thoughts, which otherwise may not find escape. Remember, brethren, that not only are the members gainers, but also many outsiders, who eagerly snatch the opportunity to peruse our paper.

Do not wait until one member makes his advances first, and then you follow; but let each one take upon himself this pleasant task. We have many in our ranks who, though they be unable to deliver an oration, yet they can place their thoughts in writing, and always to good advantage. Hoping to hear from each Union, I remain

Yours fraternally,  
J. ALLEN.

## LOCAL UNION No. 23.

SAINT PAUL, March 6, 1893.

Our membership is about 90, a great many of them being away at present. Business is nearly at a standstill, but the boys anticipate a good summer. Nothing like hope.

Minneapolis Lodge sent over two delegates to our last meeting with pressing invitations to their ball, April 4th.

We are going to charter a special car on the Interurban Line for the use of the boys and their friends. The proceeds of the ball to go into the treasury for a sick benefit.

Our Electric Light Companies are bidding for the city lighting for the coming year.

The Saint Paul Gas Co. Electric Light Station has been undergoing repairs. Their new Compound engine, 1300 H. P., made by Edw. P. Allis, of Milwaukee, was started up this week and to all appearances is going to prove satisfactory.

They are busy putting on the belt which will be the largest in the northwest, 72 inches wide, and 175 feet 8 inches long. The belt was made by Chas. Munson & Co., Chicago.

Our little brother with the big name, "Jake" Promersberger, has returned from Dakota, where he has been doing some pretty rough climbing lately.

Frank Volk, our German comedian, is the happy father of a bouncing girl. Cigars are in order.

As this is my first attempt as correspondent, the brethren must excuse any breakdown I should make. I will endeavor to improve and be "Jounie on the spot" every month with a little news anyway.

Fraternally yours,

GUS. MACKLETT.

## LOCAL UNION No. 24.

MINNEAPOLIS, March 4, 1893.

EDITOR ELECTRICAL WORKER—We received the ELECTRICAL WORKER last week. The brothers think it very neat in appearance, and the work is a model of typographic beauty. It will prove highly valuable as a work of reference in giving full information relating to the trade and we are greatly in need of such a journal as most labor organizations have one and there is no reason why we should be backward in that line. It will keep the brothers posted in their line of business, and if they are in need of work, they will know where to apply for positions.

The committee on entertainment made a report and Local Union No. 24 will give their ball at Mahtowah Hall, Tuesday Evening, April 4th.

Brother Christman resigned his position of recording secretary, and Brother Allen elected to fill his place. The former was promoted from telephone inspector to chief wire man. Brother Shelden left the Telephone Company to accept a position with the American District Telegraph Company at Duluth, Minn., for \$20 more a month. Brother Sullivan also accepted a position with the W. U. Telegraph Co.

Minneapolis was visited with the worst snow storm of the season. There are 250 miles of track in the city street railway system, and every foot of it was buried by the storm with from two to ten feet of heavy and solidly drifted snow. In the neighborhood of Thirty-sixth Street the cuts are as deep as the cars. The company has 500 extra men at work and the total expense incident to the blockade will probably reach \$10,000. All the cars were blocked and in one car thirty people stayed all night.

Electrical business is dull at present, but will take a start in a few weeks.

Our union sent \$25 to the New Haven boys.

President Fleming and Brother Heiley visited Local Union No. 23 Wednesday evening.

The brothers unite with me in wishing THE ELECTRICAL WORKER success.

The Western Union started a crew of men to string wire from this city to the coast. They wanted climbers a few days ago, but they are probably full-handed by this time, the 35, 18, 15, 7, 82, in this city 13 82, not 35, 17, 25, 15, 3, 2, 25, 40 82 1 25, (15, 74, 2) (18, 25, 1, 82, 25).

Fraternally yours,

J. C. DWYER, Press Sec.

## LOCAL UNION No. 26.

WASHINGTON, D. C.

Owing to the great amount of excitement in our city on the evening of March 3, No. 26 did not hold any meeting. Bro. H. W. Sherman, Recording Secretary of No. 44, arrived at the hall, expecting to attend a meeting of No. 26. I am sorry that he was disappointed.

Most of our boys were working day and night on the illuminations at the Pension Office, in which building the inaugural ball was held.

The electric lighting was awarded to the General Electric Company of New York.

The Annunciator work was awarded to the firm of Royce and Marean of this city. These companies deserve many thanks for the opportunities which they gave the members of No. 26. The Western Union and Postal Telegraph Companies strung special wires for the convenience of their press correspondents. The lighting capacity represented 60,000 candle power. Owing to the absence of red and blue lamps, one would have thought that the national color of this country is white. There were no colored lamps used in the decorations except in the large set pieces consisting of a fan, revolving stars and kaleidoscopes. These ornaments have all been removed, and the men are now resting after their hard work.

The usual meeting of No. 26 was held Friday evening, March 10. All the officers were present, and there was also a fair attendance of the members.

Some names of delinquent members were brought before the Union for suspension. One brother objected to having the members suspended on the grounds that they did not owe two dollars for dues only, but that part of the amount was for an assessment. He asked that the President explain the last clause of section 1, Article X., of the Constitution, and give his decision. The President decided if a member should owe fifty cents for one month's dues and \$1.50 for assessments, "he shall be suspended from membership, and can only be admitted as a reinstated member, as prescribed in Article XI." The brother appealed from the decision of the chair. The chair was sustained with only two dissenting votes. The President gave the Union notice that they would appeal to the E. B. for their decision.

One candidate was proposed. It now looks as though No. 26 were about to take another boom. There will be several strictly Union buildings for the boys to wire as soon as the season opens.

Every one who has read the ELECTRICAL WORKER is well satisfied with it, and is pleased to see each succeeding issue more interesting than the previous one. Let the good work continue. Evidently Bro. Kelly's watchword is "Onward and Upward."

W. W. GILBERT.

## LOCAL UNION, No. 27.

BALTIMORE, Feb. 24th, 1893.

EDITOR ELECTRICAL WORKER:

DEAR SIR—The Union was called to order with President Russell in the chair; routine of business was transacted. Under the head of "Good of the Union," a general interchange of ideas was indulged in regarding the building up of our Union, which brought out a great many good ideas and suggestions, which, if carried out, will help us both numerically and financially.

No. 27 is still on the move up the ladder, and hope soon to have the best element of telegraph men of the city on our roll. One of our members

met with a serious accident by cutting out on a pole, falling 40 feet to the ground and probably fatally injuring himself.

We can boast of one company in our city whose men do not drink rum in any form. It is the Maryland Electric Light Co. Their chief can attend to his other duties and know his men are at work with level heads and not in bar-rooms disgracing themselves and their Unions. This is something rarely met with in our business anywhere.

Yours Respectfully,

J. R. WILCOX,

Press Sec.

## LOCAL UNION, No. 28.

PHILADELPHIA, March 10th, 1893.

Editor E. W.:

DEAR SIR—Our Local Union is booming along; we have good quarters and meetings are well attended and interesting to all.

Very few brothers are idle or sick. Lineman Chas. Shuman, met with a painful accident while at work, thereby losing several teeth.

The Local Union realized a neat little sum over and above all expenses, from ball given on Feb. 9th. Everybody enjoyed themselves and attendance was elegant, considering the awful weather that night. Brother Peter King led the march and did it well; nobody was chasing trouble, although circuit showed wet grounds towards morning. The boys showed good fronts, which speaks well for men who have so many ups and downs in this life.

The outlook for a busy summer for Electrical Workers is very encouraging. The Philadelphia Traction Company are going to build about fifteen miles of trolley road, some to take place of cable road, and it will be hailed with delight by patrons, as by present system delays and accidents are numerous.

The Northeastern Electric Road has just begun operations on Front Street, and will give some of our brothers plenty to do following them up.

The Bell Telephone Co. of Philadelphia, are rapidly cutting in metallic their block poles.

Our worthy president at last meeting, impressed on the minds of the Union that hereafter at every meeting 30 minutes will be set aside for debate on electrical subjects; so boys, study up, and express your views at next meeting, so all can reap benefit.

Yours Fraternally,

N. T. GILBERT.

## LOCAL UNION NO. 32.

PATERSON, New Jersey, March 2, 1893.

Mr. Editor:

DEAR SIR—THE ELECTRICAL WORKER was received and highly recommended by the boys. Our union consists of thirty members, to whom John Kane, our President, is always willing to give a ready hand, also assist a needy brother; John Desmond, Vice-President, does a good deal of thinking before he speaks, and when he has the floor his bass voice can be heard all over the hall. Financial Secretary J. W. Estler is always on the alert for dues. Frank Areson, Recording Secretary, thinks the brotherhood ought to furnish him with a shorthand writer, as the motion is made and carried so quickly that he can not get half of what is said; but being a hustler, he manages to get there. Treasurer John Burns, before the meeting opens, keeps the boys in good humor with his Irish dialect. Inspector Barney O'Rourke never misses a meeting; always ready, and generous to a degree. James Carpenter, Foreman, has studied the constitution so thoroughly that he can enlighten you upon any subject. Our Trustees, one of whom is Dan McDonald, is anxiously waiting for the winter to break up, so he can put his gang to work steady; Dan Kane, the second Trustee, who is somewhat of a traveler, says that Paterson, for its size, takes the cake for pretty girls. James McGuire, electrician for the trolley railroad here, is always doing something for the benefit of the union.

Fraternally yours,

A LINEMAN.



## LOCAL UNION No. 33.

NEWARK, N. J., March 6th, 1893.

Everything here seems to be full of electricity and we expect plenty of work during the coming summer months.

Articles of agreement were filed yesterday in the County Clerk's office, between the Newark Electric Light and Power Company and the City of Newark, that practically settled the question of lighting the city for the next ten years.

The Electric Light and Power Company agree to furnish 600 double carbon automatic arc lights of 2000-candle power, each at the rate of thirty-five cents a lamp per night. The lamps are to be kept lighted from dusk till daylight each and every night in the year.

At any time the city shall so decree the Electric Light Company will furnish any additional number of lights, similar in every respect to the above-mentioned, up to 1000 at thirty cents per light.

For any number of lights over 1000 and up to 1500 the price per lamp will be reduced to twenty-seven cents per night.

Mr. Philip N. Jackson, the manager for the Electric Light Company, was asked to make or offer further reductions than those named. He declared it impossible, and said that the terms offered by his company were lower than those which were offered in other cities. He stated that there are not five cities in the country that have got rates as low as have been offered in the City of Newark.

An electric railroad will shortly be built between Orange and Montclair. A number of real estate owners are back of the scheme and they have already secured the right-of-way for most of the distance.

The Orange Cross-town Railroad Company intends to run a new electric railroad from the Bloomfield terminus of the present road through Brookdale to Patterson. The road, it is stated, will be in operation by June 1st.

Everything pertaining to No. 33 is looking bright and we now have about sixty-five members in good standing. At last meeting brother Gove was elected Vice President to succeed W. Titus, who, here lately, has made himself very much disliked.

Brother Leahey, Brother Bates and "Can't-do-without" Brother Joe Horter, were appointed to represent Union No. 33 at the next meeting of the District Council in New York.

The success of Union No. 33 is largely due to Brother Joe Horter, who is always willing and anxious to do what he can to improve our organization. Brothers, give him credit for what he has done and he is now doing.

Some of the boys say that Brother Jim Durkin is looking "rather sporty," but James says that he has "got to do it," and I suppose that settles it.

Everybody praises the ELECTRICAL WORKER and think it is the best of its kind.

Fraternally yours,

W. E. RASSETER,  
Press Secretary.

## LOCAL UNION NO. 35, N. B. E. W.

BOSTON, March 6, 1893.

Mr. Editor:

DEAR SIR—You are hereby tendered the thanks of L. U. 35 for the handsome journal you are publishing in the interests of the Brotherhood. It is certainly a credit to the organization and to its editor. Local Union No. 35 sends its assurance of appreciation and support forever, and two or three days afterwards. We are progressing slowly but surely; have now one hundred members in good standing, and half as many more delinquents, who we think will soon get into line again, as we are about to exclude from our meetings and from all other benefits those who merely joined "for fun." This is due to the fact that our new officers have impressed upon us the truth that the Brotherhood was organized for a far higher purpose; and that we

must all help to benefit others in order that we may be in turn benefited, and that we must teach by example rather than by precept.

Brother Michael Murray was severely injured at the Providence Depot falling staging accident, when so many others narrowly escaped death. He has our sympathy and best wishes for a speedy recovery.

Recording Secretary J. H. Mahoney has been ill, and unable to attend his manifold duties, but we are glad to hear that he is now convalescing. In spite of bad weather work is plentiful, and there are plenty to do it. I would not advise brothers to take out traveling cards and start for the Hub, but if they are coming this way we assure them they shall not want for that greatest of all American luxuries,

BAKED BEANS.

## LOCAL UNION NO. 36.

NEW YORK, March 10th, 1893.

Mr. Editor:

DEAR SIR—Our union was organized October 1, 1892, with eight charter members. The first meetings were held in a small room, but through the efforts of enthusiastic members and with the kind help of the ELECTRICAL WORKER, our membership has increased to ninety, with six applications for admission to be voted for at our next meeting. We have left our small quarters and now hold weekly meetings in a large, pleasant hall. Our members are a good, steady lot of men, of the right material, with officers carefully selected. Owing to the severe winter work has been scarce, but our union has been fortunate in this respect. Your paper has been received regularly and carefully read and highly appreciated.

With kind wishes for its prosperity, I remain,  
Very truly yours,

HENRY L. STRETCH,  
Press Sec.

## LOCAL UNION, No. 37.

HARTFORD, CONN., March 6th, 1893.

MR. J. T. KELLY:

DEAR SIR—It gives me the greatest pleasure to act as correspondent for Local Union 37, and also to let all brethren know how we are progressing in our Local Union. We had a hard time at first, as the telephone company jumped on us when we were young and weak, and took six of our members from us. Some of them were officers and it left us in a bad fix, but it did not take us long to get together and arrange our little difficulty, so now we are on the road to success, and those six men go around the city like the little boy that fell out of bed (they are not in it and they know it).

The Hartford Light & Power Company is erecting the New Cross-Compound Condensing Corliss Engine at its works on Pearl Street. It was made by the C. & G. Cooper Co. of Mount Vernon, Ohio, and weighs nearly 200 tons. A big second engine of the Corliss type, having 1500-horse power, is also in process of erection near this one. The plant, when completed, will be the most thoroughly equipped of any in the State, and with it the company expects to be able to supply all the electricity called for in Hartford for a good many years to come, even after allowing for the now inevitable growth in the demand.

This is certainly a good year for electric road schemes. Still another syndicate has been discovered, which will petition the legislature for power to build and operate an electric line east of Hartford to Manchester and Rockville, which, when completed, will be about 40 miles; if all the lines are built here that have the power to build (and no doubt they will when the weather will permit them, as some have been started), there will be enough work in this part of the State for the next two years.

The Hartford Electric Light Company has put in a new joint electric motor of about 350-horse power. This motor is run by electricity from the big generator on the Farmington River, and will be used instead of steam power to run the dynamos that furnish the power for the trolley lines.

The Horse-car Company is to build electric lines all over the city, to commence as soon as the weather permits them.

At our last meeting we had a committee from the Laster's Protective Union of America, of Lynn, Mass., and after they got through telling us of their grievance they had with their employers, Brother Allen got up and said that there must be a mistake some place as he was a union man and as he was wearing non-union shoes he could not make his shoes and feet agree with one another. I can not quite explain how he got his shoes and feet twisted together, but after a little while he came to the conclusion that he had the shoes on wrong; but he said that for all that he will never buy another pair of shoes unless they have a blue label on them.

Our Local Union is getting along nicely and have new applications every meeting for membership to our Union, and they are all good men.

Fraternally,

CHAS. D. EGAN,  
Press Sec.

## LOCAL UNION NO. 38.

ALBANY, N. Y., March 4, 1893.

Editor E. W.:

DEAR SIR—I take great pleasure in writing to you again to let you know how we are getting along. Everything here is very bright and hope that it is the same in your city.

At our last meeting the initiation of four new members took place. Brother Wm. Dabell of Troy, presented our union with a handsome ballot box, the design being very nice. Brother Wrenn, also of Troy, presented the union with two gavels, for president and vice-president, both of which were highly appreciated by all members.

Wishing you great success with your paper, I remain, yours fraternally,

C. S. HAMMOND, Press Sec.

## LOCAL UNION, No. 40.

ST. JOSEPH, MO., March 7, 1893.

Local Union No. 40 has been a little late getting into print but is nevertheless progressing under the most favorable circumstances.

H. F. Goode, George E. Harris and R. P. Faries, the fire department committee of the Wichita, Kan., City Council, and C. E. Potts, W. R. Dulaney and H. G. Chipchase, of Wichita, comprising a committee appointed by the mayor of that city, visited St. Joseph last week and were entertained by Superintendent McDaniel of the Missouri and Kansas Telephone Company.

The object of the committee is to inspect the workings of the fire alarm and police telephone system, invented by J. O. Stockwell of this city, which has been in operation here for the past eighteen months, and is considered by the police and fire departments to be the acme of all system, telegraph or telephone, now in use for that purpose.

Mr. P. W. O'Brien of the telephone company at Leavenworth, Kans., secured transportation from Mr. W. C. Bishop of Chihuahua, Old Mexico, and sent six linemen to the City of Mexico, to work for the Mexican Telephone Company, who are going to rebuild Derango and Chihuahua, and also make some extensive improvements in the City of Mexico.

F. P. Genauine, our City Electrician, with a force of six men, has just completed the wiring of the New Crawford Opera House. This is one of the largest contracts for wiring ever made in this city, and the work bespeaks for Mr. Genauine and his able force much credit.

Yours Fraternally,

H. T. S.,  
Press Sec.

## LOCAL UNION NO. 42.

UTICA, N. Y., March 11, 1893.

Editor ELECTRICAL WORKER:

No. 42 is rather late in appointing their Press Secretary, but better late than never. As this is the first communication with these columns perhaps it would not be altogether out of place to introduce ourselves in proper order. First allow me to present you to our worthy President, W. B. McCoy. Now, Bill (as his friends call him) is the pride of No. 42, being a veteran lineman and a model President; showing no partiality, but keeping everyone in their place, and enjoying the good will of every right-thinking member of our local. It may be mentioned on the side that he is of Irish extraction, hence our first annual ball will take place on the evening of the 17th of "Ould Ireland," and doubtless it was his idea to have the tickets and fancy posters of a green color also. Next in turn comes our able Vice-President, W. Brigham. Here again we have a good man in office, and one whom we can depend upon "being there" every time, to fill the chair, in case of the absence of the President (but that is very seldom). Altogether "Brig" is "all-right." Then our Recording Secretary, Mr. C. F. Allen, is a picture, when the Union is in session, with his head down to the desk, in the labor of keeping a conscientious record of the doings and sayings of every mother's son who gets upon his feet to say a word, and to get down every word of some member is, as you will admit, no easy nor yet a short task. But when we come to the Financial Secretary we must pay a tribute to true merit, for we have a man in Mr. G. P. Owens, who is as hardworking and as zealous an officer as any in the N. B. E. W. for he keeps strict watch on the shekels, always has a brief and business-like report to make; who says no more than is necessary, but means every word he says. Inspector McMorro is another good man, an old lineman and an earnest worker in Union matters; he it is who contrives the means to make a new candidate's initiation prove beneficial to muscular development. To sum up the whole matter of our officers, I think we are, as the boys say, "well heeled." Now in regard to the ball we are about to inflict upon the public: I would like to add that it is to be of a strictly first-class nature. We have a splendid hall, a fine orchestra, and I may add that as Bro. F. Murphy is to be floor director, we have a popular and able man at the head of the ceremonies; the committees are all impressed with their duties and will carry them out, I think. In case any one having any duty to perform should neglect the same, Bro. Jack Smith has been appointed chief constable with power to arrest, imprison and execute all committeemen who should shirk their duties. We have the refreshments in A No. 1 style; and, in fact, everything seems to smile on this our first ball. We have over 600 invitations out already, and a corresponding proportion of tickets sold. Will let you know how we come out after it is over. But stay; I will forward an invite, and that invitation will admit all of the people from the general office, from G. P. down to the printer's devil; so be sure to come, and fetch your ladies with you. Well, with stating that business is quiet in the trade around Utica, I will close until next month.

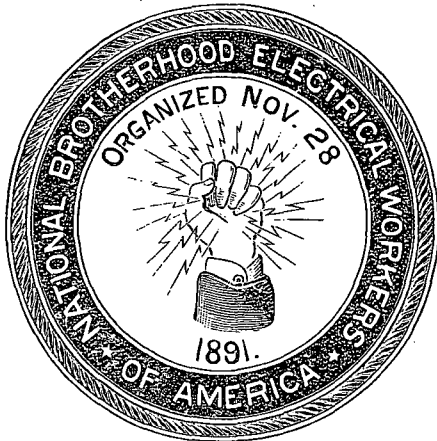
Yours in the Craft,

H. GORDON,  
Press Sec.

FRIENDS AND BROTHERS—On behalf of the editorial staff of the E. W., we return thanks to Press Sec. Gordon for his kind invitation to the ball—but Brother Gordon forgot that we are not multi-millionaires and that Utica is over one thousand miles away and walking is not very good just at present. If our kind brother will send a few hundred dollars to us by telegraph we will gladly attend the ball, in a body, printer's devil included. Hoping our absence will not mar the festivities of the occasion we wish one and all a merry time and a good balance on the right side of the cash account.

EDITOR.

## DIRECTORY OF LOCAL UNIONS.



(Secretaries will please furnish the necessary information to make this directory complete. Note that the time and place of meeting, the name of the President, the names and address of the Recording and Financial Secretary are required.)

**No. 1, St. Louis, Mo.**—Meets every Tuesday evening at 305½ Olive st. D. Lafferty, President; M. L. Purkey, Recording Secretary, 207½ N. Twelfth st.; John Hisserick, Financial Secretary, 315 Chestnut st.

**No. 2, Milwaukee, Wis.**—Meets 1st and 3d Wednesday at 526 Chestnut st. W. Denning, President; F. W. Smith, Recording Secretary, 377 Fifth st.; E. Talbott, Financial Secretary, care of 377 Fifth street.

**No. 3, New York, N. Y.**—Meets every Thursday evening at Clarendon Hall, 114 E. Thirtieth st. Second and fourth Thursdays are devoted to lectures and instructions on practical electrical subjects. John P. McMahon, Pres.; Lester C. Hamlin, R. S., 542 East 17th st.; E. D. Leaycraft, F. S., 283 Flatbush ave., Brooklyn.

**No. 4, New Orleans, La.**—Meets 1st and 3d Wednesday at Odd Fellows' Hall. Wm. Moake, President; J. C. Bradley, Recording Secretary, Napoleon and Custom House sts.; J. J. Vives, Fin. Sec., 173 S. Basin st.

**No. 5, Nashville, Tenn.**—A. H. Praugue, President; J. C. Bender, Recording Secretary, 817 N. Market st.; E. W. Morrison, Financial Secretary, 308 N. Summer st.

**No. 6, Memphis, Tenn.**—E. J. Gray, Secretary, 20 Goslee st.

**No. 7, Springfield, Mass.**—John Hoyt, President, F. Wyatt, Recording Secretary, Hotel Glenham; S. F. Cameron, Financial Secretary, 267 Main st.

**No. 8, Toledo, O.**—Meets every Thursday at 223 Summit st. James Carney, President; Michael Connors, Recording Secretary, 213 Everett st.; T. H. Nevitt, Financial Secretary, 1007 Bartlett st.

**No. 9, Chicago, Ill.**—Meets every Saturday at Plasterers' Hall, 192 E. Washington st. G. W. Elison, President; Gus Sauers, Recording Secretary, 156 E. Twenty-Second st.; J. H. Capps, Financial Secretary, room 35, 166 E. Washington st.

**No. 10, Indianapolis, Ind.**—Meets every other Monday at 33½ S. Illinois st. Sam'l B. French, President; L. E. Jones, Recording Secretary, 95 N. Meridian st.; C. W. Neal, Financial Secretary, 199 W. Maryland st.

**No. 11, Terre Haute, Ind.**—Meets every 2nd and 4th Tuesday at Washington Hall, cor. Eighth and Main sts. John Davis, President; Harry Bledsoe, Recording Secretary; Wm. C. Bledsoe, Financial Secretary, 424 S. Thirteenth st.

**No. 12, Evansville, Ind.**—Meets every Tuesday at Tenney Hall, Main st. R. Wright, President; Harry Fisher, Recording Secretary, 202 Clark st.; L. E. Wilke, Financial Secretary, box 266.

**No. 13, Cincinnati, O.**—Meets every Monday at Germania Hall, Vine st. J. C. Williams, President; J. B. Walker, Recording Secretary, 131 W. Ninth st.; H. D. W. Glenn, Financial Secretary, 27 Elizabeth st.

**No. 14, Bridgeport, Conn.**—C. F. Callahan, President, 173 Fairfield ave.; Ed Fagan, Jr., Recording Secretary, 78 Gregory st.; W. O. Kellogg, Financial Secretary, 160 Cannon ave.

**No. 15, Worcester, Mass.**—Chas. Cumming, Recording Secretary, 393 Main st.

**No. 16, Cleveland, O.**—Meets every Monday at 94 Superior st. J. J. Jennings, President; N. Duff, Recording Secretary, 44 Wilson place; J. J. Carr, Financial Secretary, 159½ Root st.

**No. 17, Detroit, Mich.**—Meets 1st and 3d Thursday at Trades' Council Hall, 224 Randolph

st. W. C. Shuart, President; I. B. Miller, Recording Secretary, 71 Henry st.; E. J. Lane, Financial Secretary, 705 15th st.

**No. 18, Kansas City, Mo.**—Meets every Friday evening at Industrial Hall, cor. Eleventh and Main sts. J. J. Jones, President; C. H. Adams, Recording Secretary, 215 W. Fourteenth st.; J. C. Taupert, Financial Secretary, M. & K. Tele. Co., Sixth and Delaware sts.

**No. 19, Pittsburg, Pa.**—H. Hart, President; W. J. Condon, 4 Mansion st.

**No. 20, New Haven, Conn.**—B. A. Kaiser, President; D. C. Wilson, 157 St. John st. Recording Secretary; J. Carter, Financial Secretary, 270 Hamilton st.

**No. 21, Wheeling, W. Va.**—C. L. Ullery, President, J. F. Bonnett, Recording Secretary, 2623 Jacob st. John Allen, Financial Secretary, box 111.

**No. 22, Omaha, Neb.**—Meets at Arcanum, Hall, 1314 Douglas st. J. J. Dooley, President, 1405 Jackson st.

**No. 23, St. Paul, Minn.**—Joe Macauley, President; Thos. Carey, Recording Secretary, 311 E. Thirteenth st. F. A. Zimmerman, 66 Douglass st., Financial Secretary.

**No. 24, Minneapolis, Minn.**—P. J. Fleming, President; W. Allen, 822 Eighth ave., S., Recording Secretary; Geo. Hulg, Financial Secretary, 25 Seventh st., south.

**No. 25, Duluth, Minn.**—S. J. Kennedy, President; Phil. Bellivere, Recording Secretary, Wieland Blk.; C. C. Miles, 28 Seventh ave., west., Financial Secretary.

**No. 26, Washington, D. C.**—Meets every Friday evening at K. of P. Hall, 425 Twelfth st., Nw.; R. F. Metzel, President; W. W. Gilbert, Recording Secretary, 941 Maryland ave. Sw.; P. A. Deffer, Financial Secretary, 941 Maryland ave. Sw.

**No. 27, Baltimore, Md.**—Meets ———. Fred Russell, President, 1408 Asquith st.; Wm. Manning, Recording Secretary, 1026 N. Front st.; J. W. Ebaugh, Financial Secretary, 107 N. Gay st.

**No. 28, Philadelphia, Pa.**—Meets ———. J. W. Fitzpatrick, President; H. B. Frazer, Recording Secretary, 1425 Vine st.; Thos. Flynn, Financial Secretary, 1116 Jackson st.

**No. 29, Atlanta, Ga.**—H. C. Bullis, President; J. R. Wellbern, Recording Secretary, 57 Butler st.

**No. 30, Trenton, N. J.**—Wm. Walton, President; Ed. G. Sarides, Recording Secretary; Thos. Conury, Financial Secretary.

**No. 31, Jersey City, N. J.**—Thos. Watson, President; Wm. Dooley, Recording Secretary, 417 W. Side ave.; John Speicher, Financial Secretary, 105 Newark ave.

**No. 32, Paterson, N. J.**—John Kane, President; Frank Areson, Recording Secretary, 214 Godwin st.; J. W. Estler, Financial Secretary, 118 E. Thirty-Third st.

**No. 33, Newark, N. J.**—Meets every Monday evening at No. 58 Williams st.; Thos. Leahy, President; J. S. Stiff, Financial Secretary, 38 Elm st.; W. Whitehouse, Recording Secretary, 117 Quitman st.

**No. 34, Brooklyn, N. Y.**—T. J. Holihan, President; T. L. White, Recording Secretary, 363 Cumberland st.; L. W. Dillman, Financial Secretary, Pt. Richmond S. I.

**No. 35, Boston, Mass.**—Meets 1st, 2d and 3d Wednesday and last Sunday, p. m., of each month. Ira M. Mosher, President; John H. Mahoney, Recording Secretary, No. 69 Essex st.; P. H. Dacey, Financial Secretary, 17 Hanson st.

**No. 36, New York, N. Y.**—Meets weekly at Ledwith Hall, Forty-fifth st. and Third av.; J. E. McGinty, President; L. L. Hall, Recording Secretary, 117 Leonard st.; John J. McDouneil, Financial Secretary, 1632 Madison ave.

**No. 37, Hartford, Conn.**—Meets 1st and last Friday of each month at Central Union Labor Hall, 11 Central Row. Morris Cavanagh, President; J. T. Neville, Recording Secretary; Geo. Dugan, Financial Secretary, Elec. Light & Power Co.

**No. 38, Albany, N. Y.**—Meets the 1st and 3rd Thursday of each month. M. J. Cellery, President; John M. Wiltse, Recording Secretary, 22 Third st.; E. Albany; Owen Dooney, Financial Secretary, 4 Rensselaer st., Troy.

**No. 39, Grand Rapids, Mich.**—J. R. Watson, President; L. L. Henry, Recording Secretary, 97 Ottawa st.; Geo. Dierdorf, Financial Secretary, 723 Fifth ave.

**No. 40, St. Joseph, Mo.**—Meets every Saturday at Weidmeier & Wildburger's Hall, 623 Messanie st.; M. L. Durkin, President; M. S. Kerans, Recording Secretary, St. Joseph Electric Supply Co.; R. W. Stockwell, Financial Secretary, M. & K. Tel. Co.



MAR 18 1893

**No. 41, Chicago, Ill.**—Meets every Wednesday at 116 Fifth ave. C. J. Edstrands, President; Chas. Osberg, Recording Secretary, 234 Townsend st.; Wm. Meacham, Financial Secretary, Crawford, Cook Co.

**No. 42, Utica, N. Y.**—Meets 2d and 4th Thursday at Trades' Assembly Hall, Bleeker st. W. B. McCoy, President; E. F. Allen, Recording Secretary, Columbia and Camelia st.; G. P. Owens, Financial Secretary, 356 Sunset st.

**No. 43, Syracuse, N. Y.**—Jas. Tyrell, President; A. D. Donovan, Recording Secretary, 305 Temple st.; Chas. Beattie, Financial Secretary, 217 N. Crouse ave.

**No. 44, Rochester, N. Y.**—W. Carroll, President; H. W. Sherman, Ninth and Rowe, Recording Secretary, J. Desmond, Western and North ave., Financial Secretary.

**No. 45, Buffalo, N. Y.**—E. Calvin, President; F. Hopkins, Recording Secretary, 77 Swan st.; T. V. Thompson, Financial Secretary, 139 N. Division st.

#### TAKE NOTICE.

Officers of Local Unions should carefully read the following rules before writing for information:

1. Give notice at once when a change occurs in Secretary's address, or when a vacancy has been filled by the election of a new officer.
2. Consult the financial report in the WORKER every month, and if incorrect, report at once.
3. Arrange to receive any mail that may be en route to old addresses of officers, when change occurs.
4. In reporting the election of new officers, use the regular blank furnished for that purpose, and write plainly the name and address of each officer.
5. The monthly report of the financial secretary must accompany the dues sent.
6. Never fill out a report of any kind until first making it out on waste paper, then copy it on the regular report blank. This obviates alterations and scratching.
7. Always put name and address on reports and letters.
8. Send in name, number of card, age, and date of admission of each new member, as he will not be entitled to benefits until his name is enrolled on the books at the general office.
9. Report promptly the suspension or expulsion of members; also traveling cards taken out.
10. When sending money always state what the amount is for; do not leave it for the G. S.-T. to guess at.
11. All orders for supplies should be accompanied with the requisite amount of money.
12. Never send money in a letter. All remittances should be forwarded by post office money order, express money order or bank draft.
13. Unions indebted for over two months' dues are non-beneficial (see Art. XV. Sec. 5). All members are interested in this matter and should look after it closely.
14. On the expiration of a traveling card the member holding said card should pay one month's dues and receive a due card and be enrolled as a member of the Union, the same as a new member.
15. All Local Treasurers should be under bond and the same filed with the G. S.-T.
16. All receipts and correspondence from the general office should be read at the meetings.
17. Read the constitution carefully and consult it on all matters that arise for consideration.
18. Make out all reports with ink and use the regular report blanks and letter paper furnished for that purpose.
19. When admitting or reinstating members the strictest inquiry as to health must be observed. If the member is married the wife's health must also be noted.

20. Claims for benefit must be filled out in every particular, and the law in regard to their presentation rigidly complied with.

22. No claims will be allowed unless the member is square on the books. Our beneficial system would cease to be an incentive for prompt payment of dues were this law not enforced.

22. Remittance of dues is not allowed under our Constitution. The amount of the dues must be deducted from the sick benefit paid by the Local. A member entitled to benefits can not get in arrears while receiving benefits. Members, by contribution, can keep the dues of a sick or unfortunate brother, not entitled to benefits, paid up.

23. Salaried officers must pay their dues and carry due cards. When salaries are due they must present their bill, and its payment passed on the same as any other bill presented to the Union.

24. Newly-elected officers must procure all blanks, documents, etc., from their predecessors.

25. Unions shall never assume to pay the funeral expenses of deceased members until first assured that the claim is allowable.

26. Preserve old due cards. They may be useful for reference in case of dispute over dues, etc.

27. Members should always when attending meetings of the Union have with them their Constitution and By-Laws; also their due cards.

28. Parties making statements in reference to recreant members will be held responsible for statements sent in for publication.

29. Matter for the ELECTRICAL WORKER must reach the general office by the 10th of each month.

As we are about to open a new roll book we request all Secretaries to furnish us soon as possible a complete roll of their members since their Union was organized. Some of the Unions with a membership of 100 to 200, according to the Financial Secretary's report, have less than twenty entered on the books at the general office, and none outside of those twenty would be entitled to death benefits.

Send in the name of every member initiated since the Union was organized, even though long since suspended or expelled. This is necessary, as we must have a correct record of every member who ever belonged to the Brotherhood.

#### (Continuation of page 7.)

of this arc, burning the attendant's face and hands, and sometimes wrecking an armature, as, of course, the two dynamos are not apt to be in synchronism when thus thrown together. Placing the switches horizontally will lessen greatly the continuance of this arc, on the same principle that I have mentioned the placing of fuse blocks on the switchboard with their faces up, and a fibre or slate partition between the jaws will prevent the arc short-circuiting the dynamo. This annoyance is only met with on feeders of considerable length and those having a large number of converters on them. It is due to inductive discharge from converters and line, and is similar to the extra current or field discharge of a dynamo. Its occurrence depends largely upon the period in the wave phase at which the circuit is opened, and is proportional to the length of the circuit and the number of converters connected on the line. I have found this discharge to occur more frequently on circuits whose converters were partially loaded. This would naturally seem to be the result when the secondary coils of the converters were exerting no action on the primary, but I have had the most severe arcing on circuits with heavy loads. The damaging result of these arcs, however, has been entirely diminished since placing the switches horizontally, as I have described. I have spoken only of the feeder ammeters. There should, of course, be an ampere meter for each dynamo. These are preferably placed together in a group at one end of the board, so that at a glance the attendant can see what load he is carrying, or on what dynamo there remains room for more feeders as the load comes or goes off. The regulators and rheostats can be placed at the base of the switchboard, or, much better, if there is room, in a compact row out in front of the board about four feet, on a strong framing of wood or iron, so that all the voltmeters can be watched at

the same time that the adjusting of the pressure is taking place. This saves the annoyance of the attendant jumping from the rheostat out to the front to catch a glimpse of the voltmeters to see how near he has come to guessing at the right amount of resistance he should have thrown in our out. The result will be far better service if the rheostats are thus arranged.

This now brings us up to the remaining feature of the switchboard—the lightning arrester—though I cannot say that, necessary as this last-named appliance is, the switchboard is the all-important place for it. There may, however, be a lightning arrester on each side of every feeder, placed in a row on the top of the board or on the wall back of it, and a heavy copper wire running along past this row and connected to each arrester with a tap wire, and the main wire leading to a good ground in as straight a path and with as few crooks and turns as possible, as every bend offers a source of self-induction detrimental to the flow of the lightning discharge. The source of ground cannot be too perfect; have several of them radiating off to different points, to a mass of metal in a well, or soldered to a water main, so should one fail, the other may be relied upon. The lightning arrester itself should be an instrument devoid of fuses, be capable of rupturing instantly the arc formed, and still remain set for a second discharge; should be free from all moving parts; not absorb energy, and should be so reliable and substantial that they could be set up anywhere on the line and forgotten, and still perform their duty. This may seem to you like an ideal instrument, but, so far as alternating currents are concerned, I am positive that this state of perfection has been attained in a certain arrester now on the market. There is no question about the efficacy of lightning arresters placed out on the line, if we wish to keep the lightning out of the station and protect our converters, especially in districts remote from other wires and tall buildings, as in the residence portion of lighting. It is a good plan to place one at the end of each feeder and branch main, and scattered at intervals midway on the circuit; they also are a wise protection over a large bank of transformers, notwithstanding the fact that we are taught to believe that lightning abhors an inductive resistance as nature does a vacuum, and that a collection of such resistance would be self-protection, yet it does not prevent the discharge entering the case of the converter; then it does not have to jump much more than the space of one-eighth of an inch over to the plates to ignore these inductive coils, reach the secondary outlets, and thence to the house wiring, when it generally finds an easy path to earth with the close proximity of inside wires to gas and water pipes, and especially on combination fixtures with poor insulating joints. This does not always completely burn out the converter, as oftentimes this discharge has only ruptured the primary coils on the first turn of the wire at the point where it has jumped to the frame holding the plates, and is easily repaired. I imagine this is the case when a discharge takes place when there is no dynamo current on the lines; at other times there is a complete destruction of both coils. In a great many instances we have traced converters burned out by lightning to defective insulation in the house wiring. Whether the ground actually existed before the disruptive discharge, or was caused by it, we could not always tell. I did find one place where the wire was fused to a gas pipe up in the attic, the discharge evidently having jumped through the insulation, as the wire had been carelessly left resting on the pipe. Of course, the primary fuse, having blown in the burning out of the converter, did not leave the circuit permanently grounded. We do not want the house wiring a safety valve to relieve the circuits of their static charges, therefore, having lightning arresters, plenty of them, that will offer an easier path to earth across small arcing gaps, smaller than can be found in the converters; but no matter how perfect the arrester is, it is valueless unless it has a good ground connection and a straight copper wire, not smaller than No. 6, without bends or turns, connecting the two. A very convenient method I have found to make a reliable earth connection for arresters out on the lines, is to dig a hole at the foot of the pole about two feet in diameter, three feet deep, and driving down through it a twelve-foot length of 1½ inch galvanized iron pipe, having on the lower end a driven well-point to allow it to be driven easily, and a cap screwed on the upper end to prevent the sledge hammer splitting the pipe. The No. 6 wire can be more thoroughly soldered to the pipe before it is sunk. The upper end should be driven to about one foot below the surface, and the hole filled in with finely broken coke, which increases the conducting surface at that part of the earth that is the driest, and the lower end of a twelve-foot pipe will usually be in moist earth, and can be relied on to furnish a good connection at all times. I once had an electric light man tell me that he considered a small

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coil of wire buried just under the surface of the earth sufficient grounding, as the rain would immediately soak the earth and make all the ground he wanted. I have observed severe lightning discharges that took place before a drop of rain had fallen.

While on the subject of the burning out of converters, I will mention an annoyance we sometimes meet with in a primary fuse blowing, arcing and welding the leading-in wires to the case, or so carbonizing the fuse box that a short-circuit is formed on the line. This will always be the case where a fuse carrying a high potential current blows in a pent-up space, with no chance for the gases to escape. The arc is being fed, and increases until a fuse is blown at the station and shuts off the supply of current. Generally, on throwing in this feeder again, after replacing the station fuse, it will be found to work all right if the wires are not fused to the converter case or everything is not carbonized inside. We have in some instances, on its again blowing the station fuse, fused up a little heavier and finally removed the trouble, not fusing to that extent that it would wreck the armature. We are learning now that it is far preferable to have no primary fuses in the converter case, but a large primary fuse and switch box combined, removed from the converter to protect it. We have long since discarded secondary fuses in converters, replacing them with copper wire; and let me remark here that this is what a member of this association meant when he made the statement before one of its conventions that we had been substituting copper wire for all our primary fuses, he evidently mistaking the primary for the secondary end of a converter. This would also be a sad mistake to make when fooling with hornets.

This short-circuiting of the line by the burning out of converter fuses and other causes led me to adopt a combined switch and fuse box on all branch lines leading from the main feeders, and we have found them of immense benefit.

The switch cuts off all connection from the line of wires in fusing up, and also makes a convenient means of disconnecting that part of the circuit to locate grounds and other trouble. Then the greatest usefulness is their blowing when there is a short circuit on the branch they protect, thus preventing every light on the rest of the circuit going out by the station fuse blowing. Then, again, it locates at once where the trouble lies by sifting it down to one of, say, twenty branch mains, by telephone calls pouring in that lights are out at such a place.

As alternating stations increase in size and larger units of dynamos are adopted—which is certainly a wise step towards economy—another class of appliances are required at the switchboard, namely, devices for independently regulating the state of pressure on any particular feeder, the dynamo pressure remaining the same. The necessity of this can readily be seen, for we will have, say, on the same dynamo, when it is of large capacity, several feeders of different loads; those carrying the greatest number of amperes requiring a higher electromotive force to overcome the drop on line, so that if this required pressure all came from one source these feeders of lighter load would be receiving too much potential and a large lamp breakage would be the result. Therefore the potential of the dynamo is regulated for the lighter feeders, and pressure raisers or "boosters" used to bring up the potential still higher for the remaining feeders. The principle of these regulators is this: If we take a converter whose capacity equals the maximum load of the circuit and connect the secondary in series with one side of the feeder and the primary across the two sides we are then adding the fifty volts of the secondary of the converter to the 1,000 volts of the line, raising its initial pressure five per cent. Adding a number of these in series in like manner, and having a suitable switch to throw them in or out in succession makes a very convenient means of raising the voltage, but resembles somewhat, as I once heard it remarked, a man raising himself up by his boot straps. I have sometimes found it very useful connecting in ordinary converters at the switchboard for temporary heavy loads, in this manner, where feeders were not provided with the regular "boosters."

Reactive or choking coils may be employed instead of "boosters" with the same end in view—i. e., the proper adjustment of pressure on feeders of unequal drop supplied from one source—only in their use they will be placed on the lighter feeders and the dynamo be made to raise the electromotive force for those having the heavier load. The first cost, I think would be in favor of the reactive coils, but the relative economy in energy consumed would be slightly in favor of the pressure raisers.

A serious annoyance is often met with on the line from the inductive effect of two parallel circuits upon each other, causing the lights to waver, or "pump," which better expresses it. When this

trouble first manifests itself in a station the engine is generally the first thing to be blamed, and the engineer is caused many sleepless nights or days in trying to remedy it.

We seldom find this effect in small stations unless the feeders are parallel to each other for a considerable distance. It is most marked in circuits that are parallel and one of them carrying a heavy load, which exerts this inductive influence on neighboring lines on the same principle as the primary coil of a converter inducing currents in the secondary parallel to it; only in the case of this action on the lines, where each line is fed from a separate dynamo, their phases, of course, not corresponding, we have in this cross-induction a very unsteady action in the current. Annoying as this trouble is it is one of the easiest to remedy. First see if some combination on the switchboard will not bring about a change in affairs. Ascertain if the several lines on which this trouble is noticed can not be all run on the same dynamo; but if this should cause this induction to appear on other circuits formerly free from it the then remaining way is to transpose the circuits midway between the starting point and where they cease to run parallel by inserting a break arm in each side of the line and joining in the shape of a cross the four ends thus formed. This will neutralize and break up the trouble completely.

These topics I have touched on in my paper have been chosen as those most interesting and worthy of discussion, and with the hope that they will be of benefit to some of you and call to mind other experiences I have not mentioned, which, if given freely before a body of this nature, will help bring about the results we are all striving for—good service and dividends.

## GENERAL NEWS.

### Where Electrical Workers May Look for Work.

**BLOOMINGTON, ILL.**—is to be connected to Lexington, 18 miles distant, and to Lerow, 24 miles distant, by an electric railway.

**HARTFORD, CONN.**—The Green Electric Light Co., capital \$100,000, will build a factory here for the manufacture of a new electric lamp.

**CHICAGO, ILL.**—The Chicago & Western Indiana Ry. will erect a power plant at 51st street to light the yards, track and buildings of the company. The construction will commence at once.

**UNION SPRINGS, ALA.**—will erect an electric light plant and water works system.

**JASPER, ALA.**—will put in an electric light plant.

**AKRON, OHIO.**—The proposed electric line connecting Akron, Canton, Massillon, Warren, Niles, Youngstown and other cities in Eastern Ohio, has taken such definite shape that work will probably commence as soon as the weather will permit.

**ERIE, PA.**—There is good prospect of an electric road between this city and Meadville being built in the near future. The water power of Wm. Geore at Venango can be used to furnish the necessary power.

**JERSEY CITY, N. J.** The North Hudson Ry. Co. has decided to dispense with the cable system and use the trolley entirely.

**LOUISIANA, MO.**—Franchise has been granted to Jas. O. Broadhead of St. Louis to construct an electric road from this city to Ashley, a distance of 18 miles.

**JACKSONVILLE, ILL.**—A company has been organized with a capital of \$3,000,000 to construct an electric road from Springfield to Winchester via Jacksonville.

**CHICAGO, ILL.**—The Chicago, Niles and Norwood Rapid Transit Co., capital \$500,000, will construct an electric road in the localities named in the title.

**CINCINNATI, O.**—The Cincinnati & Dayton Electric Railway Co. has been incorporated.

**CLEVELAND, O.**—The Council has petitioned the Legislature for authority to issue \$500,000 in bonds for establishing a city electric light plant.

**COLUMBUS, O.**—The Columbus Crosstown St. Ry. Co. has been incorporated.

**TOLEDO, O.**—An electric road, 12 miles in length, will be constructed to Maumee.

**HARRISBURG, PA.**—The Citizens' Passenger Ry. Co. will begin at once the erection of a large electric plant on the West Side, and change its lines to an electric system.

**DETROIT, MICH.**—The city has been authorized to establish an electric light plant at a cost of \$600,000.

**ST. CLAIR, MICH.**—wants 1000 incandescent and 50 arc lights. Bids will be received until March 30.

**NEW ALBANY, IND.**—The entire street railway system will be changed to an electric system, and cars will run from West Eighth street in New Albany to the center of Louisville, making the trip in a much shorter time than at present.

**OCONOMOWOC, WIS.**—The power house of the electric light plant is nearly finished, and the work of setting the poles and stringing the wires has begun.

**JEFFERSON, WIS.**—George Grimm has secured the franchise to light the city with electric light. Every business house in the city has agreed to use the electric light. About forty residences will also be furnished with the light.

**PORTLAND, ORE.**—A large force of men will start work in a few days on an extension of the lines of the Inland Telephone Company from Walla Walla to Portland. The company intends to extend the lines to Pendleton, LaGrande, Union, Baker City, Huntington and Pocatello.

**WATERTOWN, N. Y.**—will put in a municipal electric light plant.

**PORTLAND, ORE.**—The Portland General Electric Company have commenced constructing an electric railway three miles in length.

**GRAND RAPIDS, MICH.**—A company has been organized to build a large electric light and power plant at Lowell, twenty miles distant, where good water power is available, which will be used to run the dynamos. The current at high voltage, will be transmitted to this city, where it will be used for all purposes to which the subtle fluid can be applied. Messrs. C. J. Church, Chas. A. Church and Dr. McDonnell of Lowell and A. C. Seckell of this city are directors of the company. Work will begin as soon as the weather will permit, and it is expected that everything will be ready to furnish light and power in this city by early autumn.

**TACOMA, WASH.**—The Tacoma Electric Light Co. has sold its plant to the city for \$750,000.

**GLENS FALL, N. Y.**—The Glens Falls Electric Engraving Co. has been organized. This company controls Dr. A. H. Phelps, invention for engraving on glass by electricity.

**COLUMBUS, TEX.**—Work has commenced on the Columbus electric light plant.

**MARSHALL, MO.**—The Marshall Electric Light and Power Company has been incorporated. Work on the plant will begin next week.

**HILLSDALE, MICH.**—This city will soon have electric lights, work on the power house being nearly completed.

**NASHVILLE, TENN.**—The city has advertised for bids for lighting the city. The new contract will call for 350 arc lights, and the price per light is not to exceed 24 cents per night.

**MONTREAL, CAN.**—THE Central Electric Light Company of Montreal has been incorporated with a capital stock of \$500,000.

**DUBUQUE, IA.**—The Allen & Swiney Electric Street Railway, Light and Power Co. has been sold to the Old Colony Trust Company of Boston for \$225,000.

**JOLIET, ILL.**—Four capitalists have organized a new electric light company, and will soon commence the erection of a plant.

**SEGUIN, TEX.**—Work has commenced on the new electric light plant.

**ANTHONY, KANS.**—A twenty years franchise has been granted for lighting the city with electric lights. It is expected that the work will be completed in six months.

**GLOBEVILLE, COLO.**—John Crawford of Denver has secured the contract for the erection of a complete electric plant in this city. Work will commence at once.

**POSTORIA, OHIO.**—A \$50,000 carbon factory will be built here in the near future, as the location has already been secured. The factory will employ 100 men, and will manufacture all kinds of electric light carbons.

**DALTON, CONN.**—The Coos and Grafton Electric Light and Power Company, with a capital stock of \$125,000 has been organized, and has purchased the water power situated at the Fifteen-Mile Falls on the Connecticut River, and will furnish light and power to places within a radius of 25 miles. The plant will be started as early in the spring as the weather will permit.

**ELKINS, W. VA.**—is to have an electric light plant.

**KANSAS CITY, MO.** The Merchants Co-operative Electric Light Company has been organized and propose to construct and operate a plant in Armourdale.

**ADIRISON, N. Y.**—F. N. Wheaton has secured the contract to light the city with electric lights. The plant must be in operation by August 1st.

**ROCK VALLEY, IOWA**, thinks it can support an electric light plant.

**CARBONDALE, PA.**—Carbondale will have a new electric plant. New York capitalists are backing the enterprise.



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